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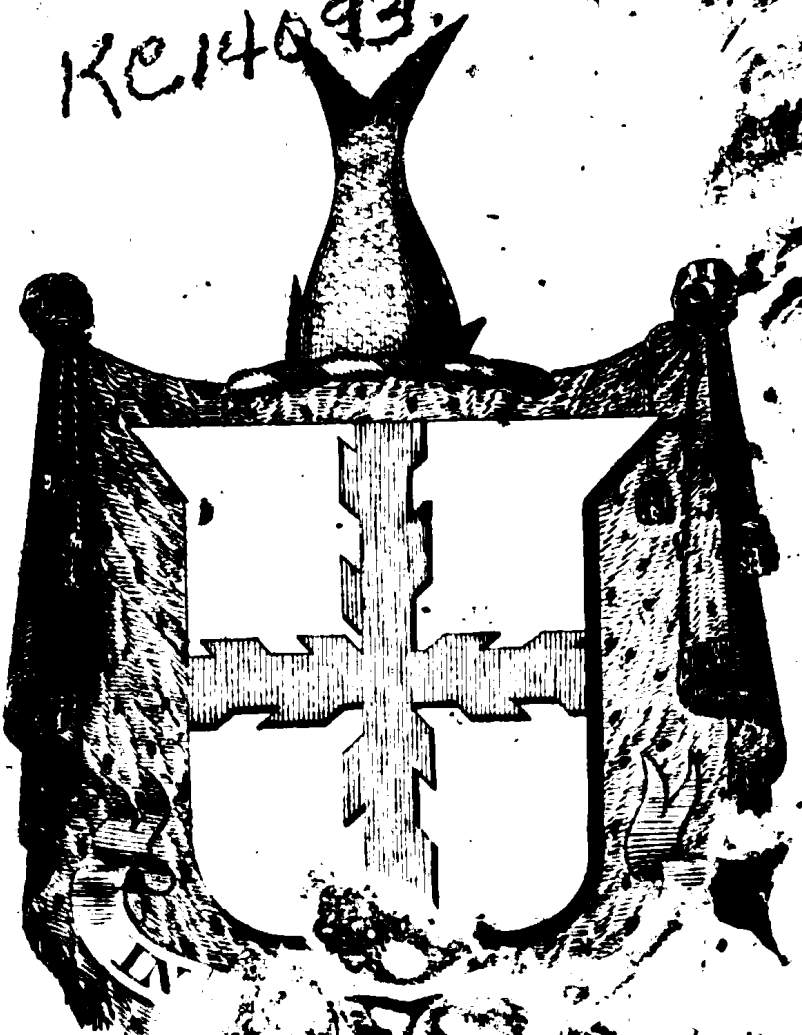

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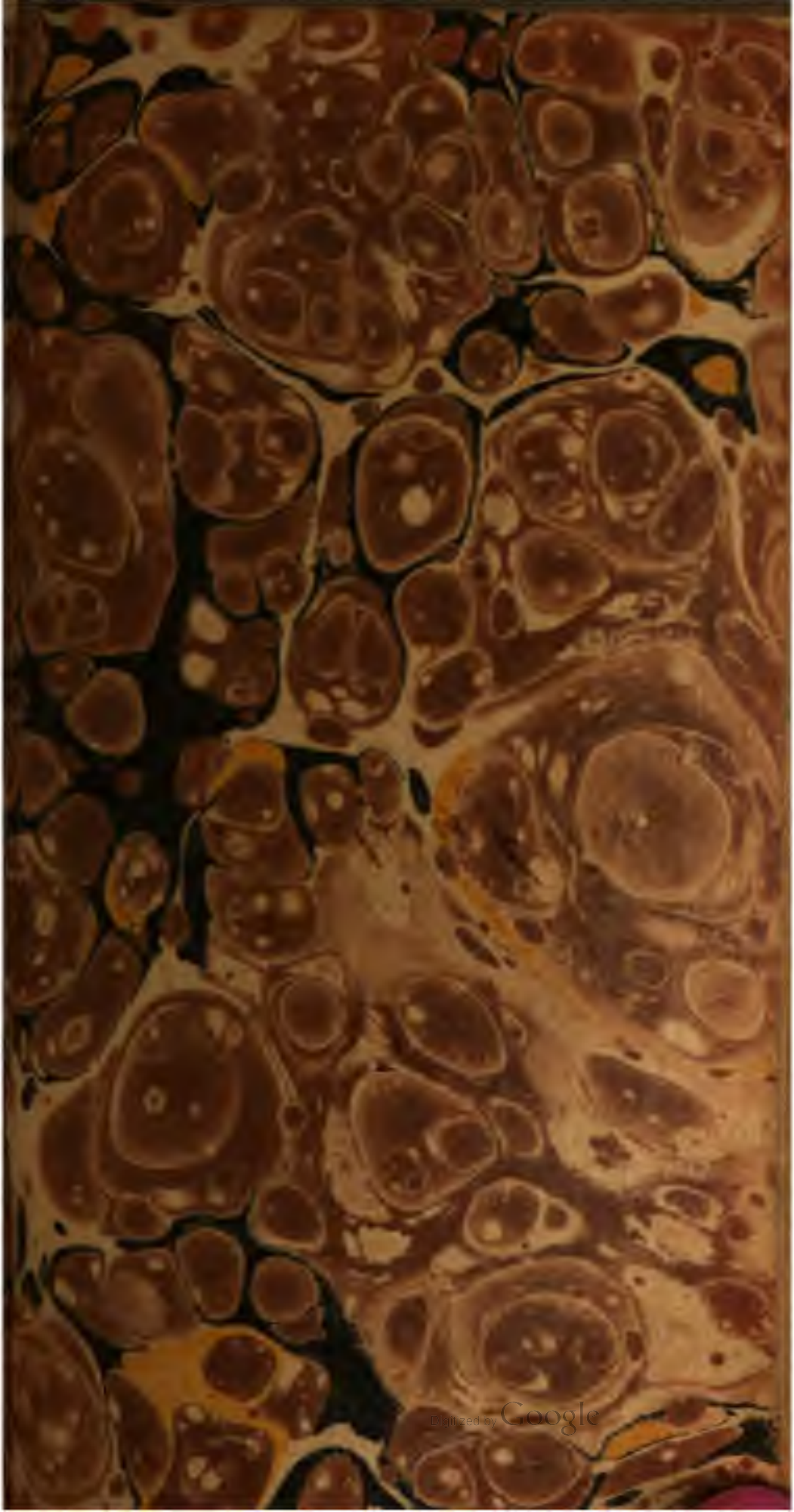
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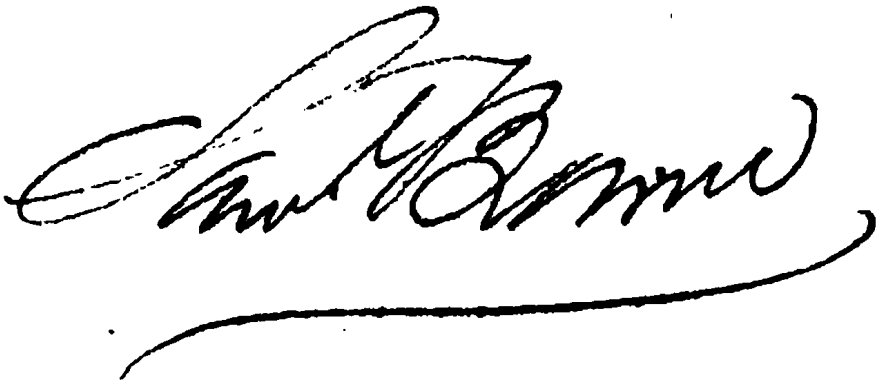

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REFLECTIONS

ON

THE WORKS OF GOD,

and of

His Providence

THROUGHOUT ALL NATURE.

Translated by a Lady,

FROM THE GERMAN OF C. C. STURM.

VOL. II.

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REFLECTIONS, &c.

JULY I.

Foreign Plants.

ALL our corn, and a great number of our vegetables, come from foreign countries, and generally from warmer climates than ours: most of them from Italy. Italy got them from Greece, and Greece had them from the East. When America was discovered, a great number of plants and flowers were found there, which were till then unknown, and which have since been transplanted into Europe with much success. The English still take a great deal of trouble, at this time, to cultivate the North American plants in their country. Most of the different sorts of corn, of which men and animals make their best food, are grass plants; but though our fields are now covered with them, they are foreign to us. Rye and wheat are indigenous in Little Tartary and Siberia, where they still grow without culture. As for barley and oats, we are ignorant indeed from whence they come; but it is certain they are not indigenous in our climate; or it would not be necessary to cultivate them. Rice is the produce of Ethiopia. Since the beginning of this century, it has been cultivated also in America; and they now send us from thence, every year, vessels entirely laden with those useful seeds. The buck-wheat comes originally from Asia: The Crusades made it known in Italy; from whence it came into Germany. Most of our her-

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bage and vegetables also have a foreign origin. Borage comes from Syria, cresses from Crete, cauliflower from Cyprus, and asparagus from Asia. We are indebted to Italy for the chervil. Aneth comes from Portugal and Spain, fennel from the Canary Islands, anise and parsley from Egypt. Garlic is the produce of the East. Shalots come from Siberia, and horse-radish from China. We owe the kidney-beans to the East Indies, the gourds to Astracan, the lentils to France, the potatoes to Brazil. The Spaniards found tobacco at Tobacco, a province of Jucatan in America. The ornaments of our gardens, the most beautiful flowers, are also foreign productions. Jessamine comes from the East Indies, the elder-tree from Persia, the tulip from Cappadocia, the daffodil from Italy, the lily from Syria, the tube-rose from Java and Ceylon, the carnation and pink from Italy, the aster from China, &c.

With what goodness does God thus provide for our happiness and enjoyment, by making even the most remote countries contribute towards it! But let us, at the same time, learn the constitution of the globe which we inhabit. There is an universal transmigration over all the earth: Men, animals, and vegetables, transplant themselves, and go from one region to another, and this transmigration will only end with our globe.

JULY II.

The Transformation of the Caterpillars.

THE transformation of the caterpillars into butterflies is certainly one of the most wonderful phenomena in nature, and deserves our attention on many accounts. The manner in which the caterpillars prepare for their change is very extraordinary. They do not all at once become butterflies,

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but pass to it by a middle state. After having three or four times shed its coat, the caterpillar strips itself of its last skin, and becomes a substance which does not in any thing resemble a living creature. It is wrapt up in a bag called a chrysalis, or nympha, and which is somewhat like a child in swadling clothes. The caterpillar remains in that state, one, two, or three weeks, sometimes six months, till at last it comes out of this kind of sepulchre under the form of a butterfly. There are, properly speaking, two sorts of butterflies; the wings of the one are raised, and those of the other are flat; the former fly by day, the latter by night in general. The caterpillar or the night butterfly spins itself a bag, and shuts itself up, or buries itself in it, when the time for its transformation draws nigh. Those that are to be day butterflies hang themselves up in the open air, on a tree, a plant, a wall, or some such thing. For this purpose, they make themselves a small web with very fine thread, and then, turning themselves upside down, they suspend themselves so that their heads are a little turned towards the top. Some of these, and particularly those we call hairy caterpillars, remain in that state, hanging perpendicularly with their heads down. Others spin themselves a thread, which goes round the middle of their body, and is fastened at the two sides. It is in one or other of these two ways that they prepare themselves for their great change. Thus, both sort of caterpillars bury themselves in a manner alive, and seem to wait patiently the end of their caterpillar state, as if they foresaw, that, after a short repose, they were to receive a new existence, and would appear again under a brilliant form.

The death and resurrection of the righteous may well be compared to the transformation of the caterpillar into the butterfly. To a true Christian, death is but a sleep, a soft repose after the pains and misery of this world; a mere moment, in

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which he is only deprived of motion and life, in order to appear again in glory, and to enter into a new and better existence. What is a caterpillar! A creeping worm, blind and despised, which, while it drags on its life, is exposed to numberless accidents and persecutions. Is the lot of man in this world much better? The caterpillar prepares, with great care, for its transformation, and that state of weakness and insensibility in which it is to fall for a short time. It is exactly the same with a good man. He prepares a long time before his death for this great change, and he waits with joy and tranquillity for the happy moment in which he is to enter into a better state. The sleep of the caterpillar does not last for ever; it is only the forerunner of a more perfect state. It crawls at first upon the ground; it then takes wing, and flies into the air. At first it was blind; it afterwards receives sight, and enjoys a thousand agreeable sensations unknown to it before. It formerly fed stupidly on gross food; it now goes from flower to flower, living on honey and dew, and continually varying its enjoyments. In all this, we behold a lively image of the death and resurrection of the righteous man. His weak earthly body appears again in a glorious state of perfection after his resurrection. As a mortal, he was attached to the world, subject to passions, taken up with sensual and earthly objects; but after his resurrection, his body is disengaged from this earth: He hovers over millions of worlds, and, with a clear and distinct view, he takes in all nature at once. His mind soars infinitely higher still; he draws nigh even to the Deity, and gives way to the most sublime meditations. Before his death, he was blind in the pursuit of truth; now he sees, and can behold it in its full lustre. His body being spiritual and incorruptible, he no longer requires gross food to satisfy his hunger. Very different sensations now form his happiness, and his heart overflows with purer joys. If such is the happy change we may

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expect, let us early prepare for it. If our present state is but transitory and imperfect, let us not make it our chief object, and let not the moments we pass here appear an eternity to us.

JULY III.

The Silk Worm.

THE race of caterpillars, which divide into two general classes (those of nocturnal and diurnal butterflies), have also different families among them, each of which has its distinct character and properties. The name of silk-worm is given to one of these: This caterpillar, like the others, is composed of several moveable rings, and is well furnished with feet and claws to rest and fix itself where it pleases. It has two rows of teeth, which do not move up and down like ours, but from right to left, in order to press, cut, and tear the leaves every way. The whole length of its back, we may see through its skin a vessel which swells every now and then, and performs the function of the heart. This worm has nine orifices on each side, which correspond with so many lungs, and assist the circulation of the chyle, or nutritive juice. Under the mouth it has a kind of reel, with two holes, through which it puts out two drops of the gum with which its bag is filled. They are like two distaffs continually supplying the materials for making its thread. The gum which runs through the two holes takes that form, and lengthens into a double thread, which loses suddenly its fluidity, and acquires the consistence necessary to support or to contain the worm. When it is time to be inclosed in it, it joins the two threads together, glueing them one over another with its fore feet. This double thread is not only very fine, but also very strong, and of an astonishing length. Each silk-worm's bag has a silk thread near as long

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as 500 ells; and as this thread is double, and all along joined together, each bag must coutain 1000 ells of silk, though the whole together does not weigh above two grains and a half. The life of this insect, whilst it is still a worm, is very short; and yet it passes through different states which insensibly bring it to perfection. At the first coming out of the egg, it is extremely small, perfectly black, and its head is still a finer black than the rest of its body. Some days after it begins to grow whitish, or of a dark grey colour. Its coat then becomes ragged and dirty. It throws it off, and appears in a new dress. It becomes large, and much whiter, but rather tinged with green, as it feeds on green leaves. After a few days more or less, according to the degree of heat, and quality of its food and constitution, it ceases to eat. It goes to sleep for about two days, then works and frets itself extremely. It becomes almost red with the efforts it makes. Its skin wrinkles and shrivels up. It throws it off a second time, and with it casts away its feet. Behold it new dressed three times in the space of three weeks or a month. It begins again to eat, and might then pass for a different creature, so unlike in head, colour, and form, to what it was before. After having again eaten for some days, it falls again into a lethargy, in recovering from which, it changes once more its coat. That is the third skin it has thrown off since it came out of the shell. It still continues to eat some time, then renouncing all food, it prepares itself a retreat, and draws out of its body a silk thread, which it wraps round itself much as we wind thread round an oval piece of wood. This consists of extreme fine silken threads. It rests quietly in the bag it has spun for itself, until the end of a fortnight, when it would break through, and make its way out, if it was not prevented, by putting it into a oven or hot sun, in order to kill it. These silk bags are thrown into hot water, and stirred about with birch twigs, to

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loosen the ends of the silk, which are afterwards wound on reels made for the purpose.

Thus it is to a worm, or a caterpillar, that we owe the luxury of our clothing. This reflection ought to humble us. Can we be vain of the silk with which we are covered, when we consider to what we owe it, and how little we ourselves contribute towards it? Let us reflect, that even the most despicable things have been created for the advantage and use of mankind. A worm, which we scarce deign to look at, becomes a blessing to whole provinces, a considerable object of trade, and a source of riches.

JULY IV.

The Rainbow.

WHEN the sun reflects its rays on drops of water which fall from the clouds, and we are placed with our backs to the sun, and with the clouds opposite to us, we observe a rainbow. We may consider the drops of rain as little transparent balls, on which the rays fall, and are twice broken, and once reflected. From thence proceed the colours in the rainbow. They are seven in number, and in the following order: red, orange, yellow, green, blue, purple, and violet. These colours appear so much the more lively, according as the cloud behind is darker, and the drops of rain fall the closer. The drops, falling continually, produce a new rainbow every moment, and as each spectator has his particular situation, from whence he observes this phenomenon, it so happens that two men cannot, properly speaking, see the same rainbow. This meteor can only last while the rain continues to fall. To consider a rainbow merely as a phenomenon of nature, it is one of the finest sights imaginable. It is a picture the most beautifully coloured of any the Crea-

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tor has given us. But when we reflect that God has made this meteor a sign of his pardon, and of the covenant he vouchsafed to make with mankind, we find subject for more than one edifying reflection. There cannot be a rainbow when it rains over the whole horizon. Every time, then, that this beautiful meteor appears, we may be certain that we have no deluge to apprehend, as in a deluge it must rain violently from every part of the sky. Thus, when the sky is only covered with clouds on one side, and the sun appears on the other, it is a sign that these dark clouds will disperse, and that the sky will soon become serene. This is also the reason why we cannot see a rainbow unless the sun is behind us, and the rain opposite to us. The sun and rain must appear at the same time, in order to form a rainbow. No colours would be seen if the sky was too light; therefore, where it appears, the horizon must be covered with dark clouds. Neither could the colours in the rainbow exist, without the refraction of the rays of the sun upon it.

JULY V.

The Birds' Nests.

THE construction of the birds' nests discovers many curious objects which cannot be indifferent to a reflecting mind desirous of information. Who is there that would not admire those regular little edifices, composed of so many different materials, collected and put in order with so much care and judgment, constructed with such industry, elegance, and neatness, without any other tool than a bill and two claws! It is not so wonderful that men can erect great buildings, according to the rules of art, when we consider that the artists are endowed with reason, and have abundance of tools and materials for it. But, that a bird, an-

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provided with any thing for the purpose, except its bill and claws, should be capable of uniting so much regularity, solidity, and judgment, in the construction of its nest, is what we can never too much admire. Nothing is more wonderful than the nest of a goldfinch. The inside of it is lined with cotton, wool, and fine silky threads. The outside is woven with thick moss, the colour of which resembles the bark of the tree on which the nest is laid, in order that it should be less observed, and less exposed to the eyes of passengers. There are some nests in which the hair, the down, and the straws, are curiously laid across and interwoven. There are others, wherein all the parts are neatly joined and tied together with a thread which the bird makes for itself of flax, tow, and horse-hair, and more generally of spiders' webs. Some birds (for example the blackbird and lapwing) plaster over the inside of their nest with a thin coat of mortar, which cements and keeps together all the bottom parts; and then while it is fresh, they stick some moss to it, in order to make it warm and close. The swallow's nest is of a different construction from the rest. They neither require sticks, straws, nor ligaments. They know how to compose a sort of cement, with which they make themselves nests, perfectly secure, neat, and convenient. Their method of moistening this cement is by going frequently to dip their breasts into the water, and then shaking it off upon it, till it is thoroughly steeped, after which they work it up together with their bills. But the most extraordinary of all the nests are those which certain Indian birds suspend with great art upon the branches of trees, in order to secure themselves from the pursuit of several animals and insects. In general, each species of birds has its particular manner of placing its nest. Some build them on houses, others on trees; some under the grass, others in the ground; but all in the

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manner best adapted for their security, the bringing up of their young, and the preservation of their species.

Such is the wonderful instinct of birds in the construction and situation of their nests; from whence one may naturally conclude with certainty, that they cannot be mere machines. How much industry and intelligence, skill and sagacity, activity and patience, do they shew in the building of their nests! Is it not clear, that in all their work they propose to themselves certain designs! They make the nest hollow, almost like the half of a globe, in order that the heat may the better concentrate there. The outside of the nest is covered with materials more or less coarse, not only to serve as a foundation, but to keep out the wind and the insects. The inside is lined with more delicate materials, such as wool and down, to make it soft and warm for their young ones to lie on. Is it not a kind of reason which teaches the bird to place its nest so as to be sheltered from rain, and to be out of the reach of destructive animals? Where do they learn they are to have eggs, and that these eggs would require nests to prevent them from falling, and to keep them warm? that the heat would not concentrate round the eggs if the nest was larger, nor hold all the young ones if it was smaller? How do they know the proper size of the nest, and the number of young that are to be born? Who teaches them not to mistake the time, and to calculate so exactly, that they never lay their eggs before the nest is finished? Nothing that has been hitherto said in answer to these questions is satisfactory, nor can this mystery in nature be explained. It requires a more perfect knowledge of the souls of animals than we have. But of what nature soever these faculties of the birds may be, they are certainly the effects of a superior power and wisdom.

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JULY VI.

The many Enjoyments we find in Nature.

ON whatever part of the creation we turn our eyes, we every where find something which interests either our senses, our imagination, or our reason. All nature is so formed as to afford us numberless pleasing objects, and to supply us with a variety of enjoyments continually succeeding each other. There is no part of the day that does not afford us both sensual and mental pleasures. While the sun illuminates the horizon, the plants, the animals, with a thousand agreeable objects, strike our eyes; and when the night spreads its veil, the majesty of the sky transports and charms us. On every side nature labours to surprise us with new pleasures. Even the smallest worm, a leaf, a grain of sand, presents us with objects for admiration. We must indeed be blind and senseless, were we not struck with this infinite variety, and were we not to acknowledge in it the goodness of the Creator. The same spring which waters the valleys, invites us to sleep, pleases the ear, and serves also to quench our thirst. The shady forest, which defends us from the intense heat of the sun, where we enjoy a delightful coolness, and where we hear the melody of various birds, feeds at the same time a multitude of animals, which are themselves food for us. Those trees, the blossoms of which are so pleasing to the sight, will some months hence supply us with delicious fruit; and those meadows, now covered with waving corn, will soon furnish us with a plentiful harvest. Nature presents no object to us that is not pleasing and useful in more than one respect. The merciful care of Providence ordained, that the colour of green, the most mild

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and pleasing to the eye, should clothe and cover the earth. It was in itself agreeable to the sight, but variety might add charms to it. For this reason we see light and shade so happily distributed, those different degrees of colour, and those various shades of green. How many different sorts of green there are, which go from light to dark by a thousand degrees! Each sort of plant has its regular and peculiar colour. Landscapes, covered with woods, bushes, greens, herbs, and corn, afford a magnificent shade of verdure; in which the tincts of this colour are infinitely varied, cross one another, mix, cut, or blend themselves insensibly, and yet are always in perfect harmony. Each month affords us different plants and flowers. Those that have served their purpose are replaced by others; and thus successively prevent any void in the vegetable kingdom. But to whom do we owe these numerous and varied gifts of nature? Who is it that provides for our wants and pleasures with such goodness and munificence? Go and ask it of all nature: The hills and the valleys will tell thee; the earth points it to our sight: the sky is a glass in which we may behold it; the storms and tempests proclaim it; the voice of thunder, the rainbow, the rain, and the snow, declare his wisdom and goodness. The green fields, the meadows covered with gilded corn, the mountains covered with forests, raising their heads to the very clouds, the trees laden with fruit, the gardens enamelled with flowers, the rose in its full beauty, all bear the impression of his handy-work. The birds celebrate him with their melodious notes. The bounding flocks, the stag in the midst of the forest, the worm in the earth, the enormous whale, which dashes the waves afar off, and overturns and sinks large ships, the dreadful crocodile, and that moving mountain, the stately elephant; all the numerous hosts of animals, which people the air, the earth,

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and the sea, they all declare the glory of the Almighty, and proclaim his existence. How unpardonable should we be, were we deaf to this general voice of nature! Oh! let us that are happy witnesses of the wonders of God, let us, in the presence of all his creatures, pay him that homage of gratitude and adoration so justly due to him. Let us not harden our hearts against such marks of his goodness. Let us look around us. Every thing reminds us of his blessings, every thing prompts us to gratitude and joy. Those rich lands where our food grows, those fields where our flocks graze, those forests which afford us shade and fuel, that sky which is over us, and gives us light, every thing invites to grateful joy. Let our souls be filled with it. Let the sense of our happiness, and of God's blessings, attend us in our walks, and follow us into solitude. We shall find that there is no satisfaction more heart-felt, more lasting, or more comfortable to human nature, than the calm pleasures which the contemplation of the works of God afford. The more we observe the beauties of nature, the more sensible we shall be that our God is a God of love and mercy; and that the Christian religion is a source of joy, and a continual motive for grateful adoration.

JULY VII.

Reflections on a Flower-Garden.

SEE and behold the flower-garden, and reflect on the number of different beauties assembled together in this little space. The art and industry of man have made it a beautiful scene of the finest flowers. But what would it have been without care and culture? A wild desert, full of thistles and thorns.—Such would youth be, if they were

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neglected to be formed, or properly educated. But when young people early receive useful instructions, and are under wise directions, they are like lovely blossoms, which delight with their beauty, and will soon produce fruit beneficial to society. Behold the night violet or the Julian flower, which towards evening scents our gardens with its perfume, in which it is superior to all others, but has no beauty. It is scarcely like a flower. It is little, and of a grey colour, tinged with green, so that it can scarce be distinguished from the leaves. Modest without show or pretensions, it perfumes the whole garden, although it is not observed in the multitude; and it is difficult to believe, that a flower, so insignificant in appearance, can shed so sweet and pleasing a perfume. It is like a person who has much wit, and whom nature has compensated for the want of beauty by more solid endowments. The righteous man often does good in secret, and in obscurity, and sheds around him the perfume of good works; and when we wish to be acquainted with this beneficent man, we find that there is nothing of distinction, either in his person, condition, or rank. In the carnation, beauty and perfume are both united; and it is certainly the most perfect of all flowers. It almost equals the tulip in its colours, and it surpasses it in the multitude of its leaves, and the elegance of its form. This flower is the emblem of a person who possesses both wit and beauty, and knows how to conciliate the love and respect of his fellow-creatures. Let us now observe the rose; its colour, form, perfume, every thing in this flower, charms us. But it appears to be the slightest and most frail of any, and soon loses the beauty which distinguishes it from other flowers. This is an useful lesson for those who shine only in beauty; and it ought to teach them not to be vain of their charms, or trust too much to them.

In general, it is a melancholy sight to see, in

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this fine season, the ground already strewed with so many faded and dead flowers. We ought not, however, to complain that Providence does not give more stability to them. The world is a great stage, where we are not always to see the same actors. It is right that those who have finished their parts should retire and make room for others. This is what the variety of God's works requires, a variety which constitutes part of their perfection. We are also sensible to the charms of novelty; it is therefore necessary that the first objects should disappear. If flowers preserved their bloom the whole year, they would not please us as much as they do by only lasting a few months. Their absence makes us wish their return. If they were continually before us, we should soon be satiated and disgusted. When we have seen an object in all its different points of view, we have in some measure exhausted its beauty, we become indifferent to it, and we aspire after new pleasures. The variation and continual succession of earthly blessings is therefore a means which Providence makes use of to render our lives constantly agreeable.

Such is worldly happiness. All is vanity.—"All flesh is as grass, and all the glory of man as the flower of grass. The grass withereth, and the flower thereof falleth away." The lilies and roses in a beautiful face fade as well as the flowers of a garden, and death leaves no traces of them. Let us then be wise enough to seek our peace and happiness in constant and durable blessings. Wisdom, virtue, and the advantages of true Christianity, never fade. They are inexhaustible sources of endless joy.

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JULY VIII.

Description of the common Phenomena of a Storm.

HOWEVER formidable the phenomena of thunder-storms may be, there is something so great and curious in them, that their different effects are well worth enquiring into. It is the more so, as excessive fright often prevents us from considering, with sufficient attention, this noble sight. When an electrified cloud approaches near enough to a tower, or a house, or to a cloud, not electrified, so that a spark flies from it, this occasions the explosion which we call a clap of thunder. The light we then see is the lightning, or the thunderbolt. Sometimes we see only a sudden and momentary flash; at other times, it is a train of fire, taking different forms and directions. The explosion attending the lightning shews that it is the vapours which occasion the thunder; by taking fire suddenly, they agitate and dilate the air violently. At every electrical spark a clap is heard. The thunder is sometimes composed of several claps, or prolonged and multiplied by echoes. There is generally some space of time between the lightning and the clap of thunder, by which we may, in some measure, judge of the greatness or nearness of the danger: For it requires a considerable time for the sound to reach the ear; whereas the lightning goes through the same space, and reaches our sight much more swiftly. Therefore, as soon as we see a flash of lightning, we have only to reckon the sounds in a watch, or how often our pulse beats between the flash and the clap. Whoever can reckon ten pulsations, between the lightning and the thunder, is still at the distance of a quarter of a league from the storm; for it is calculated that the sound takes

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near the time of forty pulsations in going a league. The lightning does not always go in a direct line from top to bottom: it often winds about, and goes zigzag, and sometimes it does not lighten till very near the ground. The combustible matter which reaches the ground, or takes fire near it, never fails to strike. But sometimes it is not strong enough to approach us, and, like an ill-charged cannon, it disperses in the atmosphere, and does no harm. When, on the contrary, the fiery exhalations reach the ground, they sometimes make terrible havock. But, as uncultivated and desert places, where there are neither men nor habitations, fill the largest part of our globe, lightning may fall millions of times without doing any real mischief. The course of the lightning is very singular, and it is always uncertain. It depends on the direction of the wind, the quantity of exhalations, &c. The lightning goes wherever it can meet with combustible matter, as, when a grain of gunpowder is lighted, the flame runs along the train, and sets every thing it meets on fire. We may judge of the prodigious force of the lightning, by the wonderful effects it produces. The heat of the flame is such, that it burns and consumes every thing that is combustible. It even melts metals; but it often spares what is contained in them, when they are of a substance not too close to leave the passage free. It is by the velocity of the lightning that the bones of men and animals are sometimes calcined, while the flesh remains unhurt: that the strongest buildings are thrown down, trees split or torn up by the root, the thickest wall pierced, stones and rocks broken and reduced to ashes. It is to the rarification and violent motion of the air, produced by the heat and velocity of the lightning, that we must attribute the death of men and animals found suffocated, without any appearance of having been struck by lightning.

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Let us reflect seriously on these strange and dreadful phenomena. We behold a heavy black cloud; It is the tabernacle of the Most High. It descends towards the earth. It is the Lord who "bows the heavens, and comes down with darkness under his feet." The wind rises, the storm begins, but God himself is in the whirlwind, and "walketh upon the wings of the wind." At his command the clouds disperse, and the thunder, lightning, and hail, are seen to fly. "Listen attentively to his voice, and to the sound that goeth out of his mouth. He directeth it under the whole heaven, and his lightning unto the ends of the earth." But if his dreadful lightnings terrify the universe, his beneficent hand abundantly provides for all his creatures.

JULY IX.

The Ants.

THE ants, as well as the bees, may be considered as a little commonwealth, which has its peculiar government, laws, and police. They live in a sort of town, divided into several streets, which lead to different magazines. Their activity and industry, in collecting and using the materials they require for their nest, is admirable. They all join in digging the earth together, and in carrying it home. They collect a great quantity of grass, straw, wood, &c. of which they make a heap. It appears at first sight very irregularly formed; but through all this apparent disorder, much art may be discovered when examined more attentively. Under the domes, or little hills which cover them, and which are always so formed as to let the water run off, there are galleries which communicate with one another, and may be considered as the streets of this little city. But what is particularly

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admirable, is the care which the ants take of their eggs, of the worms when they come out of the chrysalis when formed. They convey them carefully from one place to another. They feed their young, and remove, with the tenderest solicitude, every thing that might hurt them. They even attend to preserving a proper degree of warmth about them. Their painful labours in summer-time, when heaping up provisions, have scarce any object but the support of their young, as they themselves require no food in winter, being asleep, or insensible, till spring. As soon as their young are out of the egg, they employ themselves in feeding them; and it still costs them more trouble.—They generally have several houses, and they convey their young from one habitation to some other which they wish to people. According as the weather is hot or cold, dry or rainy, they bring their chrysalis near the surface of the earth, or remove them from it. They bring them to the surface in mild weather, and even sometimes after rain, lay them in a bright sun, or after a long drought, in a gentle dew. But, at the approach of night, rain, or cold, they take up their little ones in their paws, and carry them so low down into the earth, that it is sometimes necessary to dig above a foot deep, in order to find them. There are several sorts of these insects: The wood-ants never lie but in forests or bushes, and do no harm to fields. There are two species of these, the red and the black. Some settle in the ground in dry soils, and generally choose places where they find roots of fir-trees or birch, to make their habitations. Others live on old trunks of trees above ground, high enough to be out of the reach of its moisture. They make themselves apartments in the cavities of the trunk, and cover them with straw and other things, to shelter them from snow or rain. The field-ants are also both black and red, as well as

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the others, but they are smaller. They settle either in the corn or the field. When the weather is dry, they bury themselves pretty deep; but as soon as it becomes rainy, they raise their habitations higher and higher, according as there is more or less damp; and, when it abates, they never fail of returning to their subterraneous apartments. It is also to be observed, that the ant requires wings; and that, towards autumn, they are seen to fly in swarms over ditches and other water. But, are these mischievous insects worthy our attention, spoiling, as they do, our fields and meadows! By their subterraneous works they make the ground hollow, tear it up, and prevent the plants and roots from growing. They are reproached more still: They are enemies to the bees and silk-worms; and they are supposed to hurt the flowers, and particularly the young trees. It is said they devour the buds and shoots; and that, getting under the bark of trees, they gnaw them to the quick. For this reason the ants are destroyed wherever they are found. If the ants gathered honey, though at the expence of a million of other creatures, they would be highly valued, but, because their labours hurt some useful plants, we think ourselves authorised to destroy them. Suppose even that in reality they do us some harm, are they therefore less worthy our attention? Do none deserve our observation but such as are useful to us? Let us banish this prejudice. Even the ants may afford us instruction and amusement. The form of their limbs, their industry, their indefatigable labour, the police of their republic, their tender care of their young, and perhaps a thousand other qualities, which we are not acquainted with, might convince us of the wisdom of that great Being, who is their Creator as well as ours. For, of all the works of God, there is not one which has not its use, and is not worthy of admiration, however

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useless, or even hurtful, it may appear at first sight. The supreme Creator, by whom all things exist, has created nothing without design, nothing that has not its use and purpose. The trees have not a leaf, our meadows have not a blade of grass, nor our flowers a fibre, that is useless.

JULY X.

The Hail.

HAIL is nothing but drops of rain, which, freezing in the air, fall in pieces of a spherical, oblong, or angular form. It appears extraordinary, that, in the very warmest seasons of the year, vapours should freeze in the atmosphere. We may consider that even in the greatest heats, the upper region of the air is cold to a sensible degree, and full of snow. If it was not so, how could the highest mountains remain the whole summer covered with snow. In the hottest parts of America, it is so severely cold on the highest mountains, that there is continual danger of being frozen; and, of course, it would snow from this extreme cold in the upper region of the atmosphere in the very middle of summer, if the snow did not melt in falling before it reaches the ground. But when these particles of snow collect together, the drops begin to freeze; and, as in falling, they go rapidly through warmer regions of air, it happens, that before this warmth can have penetrated through them, their cold increases so as to be entirely frozen. It might be imagined that the cold, on the contrary, ought to abate in proportion as they pass through a warmer air. But what is the consequence in winter, when cold water, which has been exposed to the outward air, is brought into a very hot room? It freezes and becomes ice, which would not have

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happened if it had been put into a cold room. This is precisely the case in respect to the hail. When cold bodies pass suddenly into hot air, their cold increases to such a degree as to turn to ice. The volatile salts, more or less dispersed through our atmosphere contribute much to this. We must not therefore be surprised that storms are not always attended with hail, as it requires great abundance of saline vapours to occasion the sudden freezing of the drops of water. Though hail is more frequent in summer time, it falls also in other seasons: For, as in every part of the year the saline exhalations may ferment in the atmosphere, so it may hail in winter, autumn, or spring. The hailstones are sometimes round, at other times concave and hemispherical, often conic and angular. Their usual size is that of small shot or little bullets, seldom as large as nuts. It is asserted, however, that there have fallen some as large as the eggs of a goose. The difference we observe in the form and size of hailstones may proceed from many accidental causes. The winds, particularly violent winds, that cross one another, certainly contribute much towards it. A hailstone may also in its fall meet several other cold particles, which considerably increase its size; and often the small hailstones meet others, and, in joining together, form into large ones. It is certain that when the hail is very large, it does inexpressible mischief to the vintage and harvest, fruit, &c. But this does not authorise us to consider it as a curse from Heaven, a judgment, or a punishment from God. If the violence of this meteor sometimes lays waste acres of land, and breaks millions of windows, this mischief, however great it may be, is nothing in comparison of the advantages which accrue to us from it. The hail evidently cools the air in the burning heats of summer. And it is very remarkable, that, though all the meteors appear to succeed one another,

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without any regularity, and are all different one year from another, yet this apparent disorder never fails to produce fertility.

Here then, again, O God! Thou shewest thy goodness and wisdom; therefore we will glorify Thee, even in the midst of hail and storms; for thy beneficent hand worketh admirable things, and never ceases to enrich and fertilize the earth.

JULY XI.

Use of Storms.

A DUTY, which ought to appear to us the more indispensible, because it is neglected by many thoughtless, ignorant, and ungrateful people, is that of considering all the phenomena of nature, in the light which may most sensibly impress upon our minds and hearts the wisdom and goodness of our heavenly Father. It is true, that it must be allowed he sometimes make use of natural phenomena to punish the sins of mankind; but these particular cases do not prove that God does not chiefly, and in general, purpose to himself the good of the whole. All nature affords undeniable proofs of it. We will now dwell on one single phenomenon, particularly adapted to convince us of it, and on which we require that our common opinions of it should be rectified. Are we not many of us, from our infancy, accustomed not to pronounce the words thunder and lightning without trembling? We are so unjust, that we only think of those very rare cases when storms are fatal to a very small part of the universe, while we are totally insensible to the great advantages which result from them, taken in the whole. Alas! we should soon change our language, if God, provoked at our ingratitude and complaints, was to deprive us of the blessings we derive from

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thunder-storms. It is true, that we are not capable of pointing out all the advantages which accrue from them, but the little we know is sufficient to fill our hearts with gratitude towards our great Benefactor. Let us represent to ourselves an atmosphere loaded with noxious and pestilential vapours, which thicken more and more by the continual exhalations of earthly bodies, so many of which are corrupt and poisonous. We must breathe this air: The preservation or destruction of our existence depends upon it. The salubrity or unwholesomeness of the air gives us life or death. We feel how we are oppressed in the stifling heat of summer: With what difficulty we breathe! what uneasiness we experience! Is it not then a great blessing, that we ought to be grateful for to God, when a salutary storm comes to purify the air from all noxious vapours; and, by lighting up the saline and sulphureous particles, prevents their dangerous effects, cools the air, which recovers its elasticity, and restores us to our usual facility of breathing! Were it not for storms, the dangerous exhalations would more and more increase, and be more and more corrupt. Men and animals would perish by millions. Which is then the most reasonable, to fear, or to wish for storms? To murmur at the slight mischief they may sometimes occasion, or to bless God for the precious advantages they procure us? Let us add, that not only men and animals are benefited by purifying the air, but that it is also very useful to the vegetables. Experience teaches us, that the rain, which falls when it thunders, is the most fruitful to the earth. The saline and sulphureous particles, which fill the atmosphere during a storm, are drawn down by the rain, and become excellent nourishment for plants; without mentioning the number of little worms, seeds, and little insects, which are also drawn down in thunder showers, and are,

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with the help of a microscope, visible in the drops of water.

Such reflections as these may moderate the excessive fear we have of thunder, which shews how little confidence we have in God. Instead of filling our minds with frightful and terrible ideas, let us accustom ourselves to consider a storm as a sublime and great object. Instead of speaking of the misfortunes occasioned by thunder, let us reflect rather on the necessity and great use of storms. Instead of praying to God that there may be none, let us pray that he may vouchsafe to send them now and then! or rather let us trust entirely to that great Being who always governs the world with wisdom and goodness. Every time a storm arises, let us say, in the fulness of our hearts, and with entire faith, Almighty God! it is Thou who commandest the thunder, and directest the lightning. We are in thy hands, and it depends on Thee either to save or to destroy us. At thy word the storm will lay waste our country, or make it fruitful. Thou art great, O Lord! and thy power is boundless. What can we do against Thee, or where could we fly to escape thy anger? But we are thy children, and thou art a merciful father. Thou speakest to us in thunder, but it is to bless us.

JULY XII.

The Earth and its Original Constitution.

GOD has made the earth of a proper nature for the production and growth of herbs, plants, and trees. It is compact enough to contain and hold the vegetables so firm, that the wind does not throw them down; and yet it is light and moveable enough for the plants to extend their roots in it, and draw out the moisture and nour-

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tive juices. Even when the surface of the earth is barren and dry, this lightness gives power to the juices to rise up, as in the capillary vessels, to furnish the trees with the nourishment they require. Besides this, the earth is full of juices which are good for the growth of plants. And, that all sorts of vegetables should grow and draw subsistence from the earth, God has formed several sorts of soils, which serve for other purposes also; such as potter's earth, clay, chalk, and gravel. Some serve to make bricks, others to build with, and some to make earthen ware. There are also kinds of earth which are made use of in dying in colours, and even in medicine. The unevenness of the ground has many advantages: A greater number, and a greater variety, of animals and plants may live on mountains; they serve to break the violence of the winds; they produce a great variety of wholesome plants and fruit, which would not do well in plains. They contain in their cavities, the minerals and metals so useful to us: From them proceed the springs, and most of the rivers produced by the melting of the snow, by rain, and other vapours. The stones that are under ground serve to build walls, to make lime and glass. As to the metals, their uses are numberless: Let us only think of the many tools our workmen and artists require; the utensils and furniture of every sort made of them, which furnish us with so many conveniences and ornaments. We also draw considerable advantages from the hardness and weight of those bodies. Nobody is ignorant of the use of minerals. Salt serves to season our food, and keep it from corrupting. The sulphureous particles of bodies render them combustible. Even volcanoes and earthquakes, whatever mischief they sometimes do, are still useful and necessary. If the fire did not consume the sulphureous exhalations, they would spread too

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much in the air, and would make it unwholesome; many warm baths would not exist, and many minerals and metals would never be produced. It is to our ignorance we should impute it, if there are so many things of which we do not see the use. At the sight of certain phenomena in nature, sometimes hurtful to us, we ought always to remember this maxim: If God now and then permits certain imperfections to take place, it is that they may contribute to the greater perfection of the whole. In order to judge of the works of the Lord, and to acknowledge the wisdom of them, they must not be considered only in one point of view, but taken in the whole. Many things we think hurtful, are notwithstanding certainly of use. Others appear superfluous: and yet, if they were wanting, they would leave a void in the plan of the creation. How many things appear to us insignificant, only because we do not know the real use of them! Put a loadstone into the hands of a man who does not know its virtue, and he will scarce deign to look at it; but tell him that we owe to that stone the progress of navigation, and the discovery of a new world, and he will then be of a very different opinion. It is the same with respect to a million of things which we despise, or judge ill of, because we do not know the use of them, nor see the connection they have with the whole.

Lord! The earth is full of thy blessings; every thing that is upon it or under it. The very dust is planned with wisdom!

JULY XIII.

Of the Phases of the Moon.

EVERY observation confirms to us that the moon has a particular motion of turning round the.

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earth from west to east. For, after having placed itself between us and the sun, it retires from under that body, and continues to go back towards the east, changing from day to day the place of rising. At the end of fifteen days it will have reached the most eastern part of the horizon at the time the sun sets with us. It is then in opposition. In the evening it rises above our horizon when the sun retires below it, and it sets in the morning about the time the sun rises. If, then, it continues to describe the circle which it has half finished round the earth, it removes visibly from its point opposite to the sun, it will draw nearer to the sun, and will appear later than when in opposition, till by degrees it will only be seen a little before sun-rise. The revolution of the moon round the earth explains why it rises and sets at such different times, and why its phases are so various, and yet so regular. Every body knows that a globe illumined by the sun, or by a flambeau, can only receive the light directly on one side. We perceive, at first sight, that the moon is a globe which receives its light from the sun.—When, therefore, it is in conjunction, that is to say, placed between the sun and us, it turns all its illuminated side towards the sun, and its dark side towards us, and is then of course invisible. It rises and sets with the sun in the same region of the sky. This is what we call new moon, or the conjunction. But when the moon retires from under the sun, and goes back towards the east, it has then no longer all its dark side turned towards us; a small part of it, a little border of the lighted half, begins to appear. This illumined border we see on the right side towards sunset, or even before it. The horns of this crescent turn to the left, or facing the east. The farther the moon removes from the sun, the more visible it becomes to us. At the end of seven days, when it has reached a quarter of its course round

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the earth, it discovers more and more of its illumined side, till it shews us half of it. The light part is then turned towards the sun, and the dark part casts no light on us. Exactly half the moon is the illumined. The half of that half can only be the quarter of the whole globe, and it is in reality this quarter which appears to us. The moon is then in its first quarter. By degrees, as the moon removes from the sun, and as the earth comes between them, the more of that part of the moon which faces us becomes light. At the end of seven days, reckoning from the first quarter, it is almost directly opposite to the sun, and then its whole illumined disk presents itself to us. It then rises in the east exactly at the moment the sun sets in the west, and we have a full moon. Next day the lighted half is already a little turned from us, and we no longer see it at all. The light gradually leaves the western side, extending itself in proportion on the half not facing the earth. This is the decrease of the moon, and the more it goes forward, the more the dark side increases, till at last half the dark side is turned towards the earth, and consequently half the light side. It has then the form of half a circle, and is what we call the last quarter.

By the admirable harmony which subsists between the motion of this planet on its own axis, and its course round the sun, it so happens that the moon still shows us the same half of a globe which it has shewn since the beginning of the world. During so many thousands of years, this globe has constantly, and without deviating from the same course, finished its revolution in twenty-seven days and eight hours. Regularly, and at the same period, it has lighted sometimes our nights, and sometimes those of remote countries. With how much goodness has it pleased Divine Wisdom to grant to our earth a faithful companion to light almost half our nights! Alas! we are not

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properly sensible of the value of this wise plan of the Creator. But there are people who are more so than us, and to whom this light is indispensible. They must certainly be more grateful for this blessing than we generally are.

The continual changes of the moon, both in respect to its phases and its course, are lively images of the revolutions to which all earthly things are liable. Sometimes health, spirits, plenty, and a thousand other blessings, concur to make us happy, and we walk in a blaze of light, to express it so; but, at the end of a few days, all this splendour vanishes, and there remains only the sad remembrance of having enjoyed those frail blessings. How ardently therefore ought we to wish to go from this uncertain world, to those happy regions where every blessing will appear to us so much the more valuable as they will never be subject to change.

JULY XIV.

Mineral Waters.

WHETHER we consider mineral waters in respect to their formation, or the benefit that accrues to us from them, they are certainly valuable blessings bestowed upon us by God. But even the places where these salutary springs flow are seldom what they ought to be, places consecrated to praise and gratitude towards Heaven. Let the following reflections make us more grateful to our heavenly Benefactor: In the first place, are not the springs from whence we draw the common salt to season our food, worthy our attention? It is probable that these springs originate from the mineral salt which the waters dissolve under ground. The mineral hot baths are not less remarkable: There is not only so great a number of

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them, that in Germany alone they reckon about sixscore, but they are also so hot, that it is necessary to let the water cool for twelve, and sometimes eighteen hours, before they are fit to bathe in. What is the cause of this extraordinary heat? It certainly is not the sun; for if it were, the waters would only preserve their heat in the daytime when the sun shines, and they would grow cold in the night or in winter. Neither can it be attributed to subterraneous fires; for then it would still be necessary to account for the medicinal virtue of these baths. The most simple cause we can give is this, that the waters, passing through ground mixed with sulphur, fire-stones, and metals, acquire this degree of heat. When the water falls on those quarries, the sulphureous and ferruginous particles which it dissolves, heat and take fire by the friction and re-action of their principles, and communicate this heat to the water. Medicinal waters, particularly the acids, are produced by the dissolving and mixing with the minerals they wash away. They are found particularly in places where there is abundance of iron, copper, sulphur, or charcoal. This is the reason there is such difference both in the effect and taste of them, in proportion as they are more or less mixed with these. They are bitter when they are produced by bitter roots, saltpetre or copper. They are cold when they come out of rocks, or are impregnated with sal-ammoniac, saltpetre, alum, &c. Oily and bituminous substances make them oleaginous; brimstone, mixed with acids, makes them sulpureous.

Let us admire the divine goodness which has prepared for man those salutary and inexhaustible springs. Mineral waters may certainly answer many other purposes; but it cannot be doubted they were also produced for the preservation of the health of mankind. It is for man that the Lord has made these beneficent waters spring up. Let

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as then acknowledge his goodness, and be sensibly touched with it. Those particularly who experience their strengthening and salutary virtue, let their souls, penetrated with joy and gratitude, be lifted up to their heavenly Father. Let them glorify him, by imitating his example, and let their riches be sources of life and consolation to their fellow-creatures in necessity.

JULY XV.

The Continual Activity of Nature in the Vegetable Kingdom.

WHOEVER wishes to know why nature is never idle through the course of the whole year, has only to reflect on the numberless advantages which result from this constant activity. Vegetables were designed for the use of men and animals; both for food and pleasure to the former, as food only to the latter. The beneficent Creator, in order to bestow nourishment on man in the most pleasing manner, ordained that the plants, instead of coming all at once, should succeed each other. In reality, if they were produced at the same time, this purpose could not be fulfilled.—How could men find time to get in their crops and harvests, if every thing was ripe at the same time? How could all of them be preserved, as many are of very short duration, and soon lose their taste and qualities!—What would then become of the pleasing sensations they afford to our sight and taste?—What flavour would cherries and other summer fruit have, if we were to eat them in winter covered with snow and ice? Would not wine turn to vinegar, if the grapes were to ripen in the heats of summer? What would become of so many millions of animals, whose preservation the beneficent Creator watches over, as well as that of man

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kind? How could they live if all the produce of the earth came to maturity at the same time?—There are an hundred sorts of insects who feed on flowers. How could they subsist if those lasted only one or two months? Could they gather enough to have always sufficient food? It is true, that most insects find none in winter; but then they fall into a sound sleep, and do not require any; which would not be the case in summer, as the heat would waken them. It is then certain, that if nature was planned otherwise, men, as well as animals, would not only suffer by it, but even perish with hunger: and we may safely assert, that their support is one of the chief designs of Providence in the constant activity of the vegetable kingdom. If we next reflect on the pleasures of sight and taste, which God has pleased to grant to man, we shall find, that for this purpose also it was necessary that nature should be thus planned. It required, not only that the flowers should be displayed in full beauty, but that there should be some all the year for our continual enjoyment. In spring, when we go to the country, in order to contemplate the many productions which the Creator causes to spring up for our food, we behold the trees in full bloom. Towards summer, when farmers are chiefly taken up with the corn, a thousand beautiful flowers charm the sight. They appear successively, and replace each other the whole season, as long as man can enjoy this object. At last when, the cold winter arrives, and shuts us up in our houses, nature produces other vegetables, which are not indeed striking to the sight, but which have a thousand uses. All this proves, that the pleasures and comforts of mankind are purposes proposed by God in the plan of nature.—Every thing is so ordained as to provide sufficient nourishment for men and animals, and also that the former should enjoy as many pleasures and comforts as possible. Consequently some plants

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produce their blossoms and fruit in spring, others in summer, others in autumn or winter. Thus each has its allotted time, and appears precisely when most useful. Scarce have some done their service, when others appear in full beauty. We behold millions of plants, and they all follow the same law.

Every thing created by God is according to the same wise and regular order, though our limited understandings may sometimes prevent us from discovering the use and purpose of them. Let us therefore bless our Creator, give him glory for all things; and let us acknowledge that in all the revolutions of the vegetable kingdom, God has our welfare in view. With what gratitude ought not this thought to inspire us? And what sweet satisfaction should we not feel every time we contemplate the beauties of nature!

JULY XVI.

The Beauty and Use of Meadows and Fields.

THE sight of a large beautiful garden in summer gives us a lively pleasure which our apartments do not afford, of which we can form no idea. But even the pleasure we feel from the finest garden is not to be compared to that of walking in fields and meadows. The stately tulip, the elegant narcissus, the beautiful hyacinth, none please so much as the simple flowers which enamel the fertile valley. Whatever charms the flowers may have which are cultivated in our gardens, those in the fields are still more pleasing. There is beauty in the former, but in the latter there is both use and beauty. Mere useless beauty pleases for a moment only. Is it not true, that in those long gravel walks, so even and neat, those arbours and summer-houses, those parterres with pretty borders, those walls,

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those inclosures; is it not true that we feel confined, and as if oppressed in them? All those places where the view is confined, seem to set bounds to our liberty. We seem in some degree to be more independent, and more at ease, in proportion as our walk enlarges and lengthens before us. In the country, in summer, Nature, fruitful and beautiful, varies every moment her appearance; whereas, in our ornamental gardens, we continually behold the same objects. Even their order and regularity prevent us from being long pleased with them. They have nothing new to offer us, and we tire of them. The eye, on the contrary, wanders with pleasure over objects continually diversified, and extending as far as the sight can reach. It was in order to give us this enjoyment, that in most places the ground was formed smooth and even; but, to the end that we might also have pleasing distant prospects, our horizon is surrounded with rising hills. Nature has done still more: she has spared us the trouble of cultivating those flowery meads, or of watering them. An innumerable multitude of seeds are sown in them, which produce a verdure scarce ever interrupted, or which is at least easily renewed. This prodigious variety of plants with which a field is covered, is not for the sight only. They have each a seed, a blossom, qualities, and beauties, peculiar to themselves. It is true, that the same species of herbs is prodigiously multiplied in each field; but perhaps we do not make two steps without treading on an hundred different sorts, each of which has its peculiar use. To the pleasure fields afford us, our beneficent Creator has added considerable advantages. They produce plants for our food, and a wonderful number of simples, which serve for medicine. But the greatest use the fields are of to us, is the feeding, without expense, those animals we can the least dispense with. The ox, as well those

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whose flesh we eat, as those whose labour helps to plough our ground, requires no food but grass. The horse, whose services are innumerable, demands no other recompense for his toil than the free use of the field, or a sufficient quantity of hay. The cow, whose milk is one of the great supports of our life, asks nothing more. The field is the most complete inheritance: it is even preferable to meadows, as its produce is certain, and requires neither sowing nor labour. It only costs the slight trouble of gathering what it yields. Its productions are not casual, for it seldom happens that fields are destroyed by drought or inundations. But it is melancholy that men, who are generally so inattentive, so insensible to the blessings of God, should be so in this respect also. We look upon grass with contempt or indifference, perhaps because it grows under our feet, and has not been made the object of our care and culture. But whatever may be the cause of our indifference, it is certainly quite inexcuseable. Would to God, that, at the sight of our meadows, enamelled with flowers, we were sensibly touched with the goodness of the Creator, who, with a bountiful hand, pours out abundance for men and animals!—— Would to God that we were well convinced that his mercy is every where, and that there is not a corner of the earth where we may not discover traces of his good providence! Yes, every country, every soil, the good and the bad, the sandy and the marshy, the gravelly, and the clayey, all equally proclaim the beneficence of the Preserver of the universe.

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JULY XVII.

The Morning Twilight.

IT cannot be doubted that this phenomenon, which we daily behold, is, equally with the rest, designed for our benefit. The twilight is nothing more than a prolongation of day; which prepares our eyes sometimes to bear the full light, and at other times the darkness of the night. But twilights are not always the same; they vary according to seasons and climates. Toward the poles they last longer than in the torrid zone. The people of that zone behold the sun rise directly above their horizon, and sink down in the same direction under the lower hemisphere; by which means they are left all at once in total darkness. On the contrary, the sun reflecting its rays obliquely towards the poles, and not sinking much below the horizon of the neighbouring people, their nights, though long, are almost all along attended with the twilight; therefore not dark. It is an happiness for the former to have scarce any twilight, and for the others to have an almost constant dawn. As for us, who are placed nearly at an equal distance from the torrid and frigid zones, we plainly observe that our twilights become shorter in proportion as the days shorten; and that they increase as the days lengthen. We enjoy day-light an hour and more after the sun has set. The twilight is equally long before the sun rises above the horizon. We owe this useful circumstance to the properties of the air. God hath surrounded the earth with an atmosphere, which rises very high. He formed such proportion between this air and the light which comes upon it, that when it enters directly down into it, nothing can obstruct its course; but when a ray

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enters sideways, or obliquely, into this air, the ray instead of passing through the air in a direct line, bends or descends a little lower; so that most of the rays which pierce the atmosphere alongside of the earth, fall again, by means of this inflection, upon the earth. Instead of following their course in passing by the side, they are bent by the air, and directed towards the earth. Thus, when the sun approaches our horizon, many of its rays which pass by us, and are not sent towards us, meet the mass of air which surrounds us, and bending in that mass they reach our eyes, so that we see day-light long before the sun itself appears. This refraction of light in the body of air which surrounds us, is a work equally full of wisdom and goodness for all the people of the earth; but it is a particular blessing to those who inhabit the frigid zones. They would be plunged in frightful darkness for several months together, if they had no twilight. Perhaps this explanation of the origin of twilights may not be intelligible to every body, but let us leave to philosophers a further detail of it, and let us limit ourselves to the reflecting on it as reasonable beings, and as Christians. It only requires an upright heart, willing to glorify his Creator. The honest, though ignorant Christian, may possibly be wiser than many philosophers, who, while they explain and calculate the twilights, lose sight of that great Being who gives to man the light of day.

JULY XVIII.

Evening Twilight.

THE evening twilight is that faint light which, after sun-set, still is visible in our atmosphere, particularly in the west. It is occasioned partly

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by the refraction and reflection of the rays of the sun in our atmosphere; and partly by the atmosphere of the sun itself, known by the name of zodiacal light, which sometimes appears, but particularly towards evening in spring, and in autumn towards morning. When the sky is serene, the smallest stars are visible at twilight; which continues from sun-set till the dark night, and generally lasts two hours. In the island of Senegal, where the nights are almost always as long as the days, the twilight lasts but a few moments. The interval between sun-set and the darkness of night, is scarce more than a quarter of an hour. Thus, as soon as the sun is ten or fifteen degrees below the horizon, darkness is spread over all the country, and it is like midnight. It is about the first of March, and the eleventh of October, that our twilights are the shortest. When the northern declension of the sun, and that of the equator under the horizon, are such that the sun does not descend eighteen degrees below the horizon, the twilight lasts all night. This is the reason that in the summer solstice we have scarce any night in our countries; and that there is none in the more northern parts, though the sun is below the horizon.

The advantage which accrues to us, and many other creatures, from twilights, is very evident.—To go all at once from broad day to dark night, would be very inconvenient. So sudden a change would hurt the organs of sight. Travellers would lose their way, surprised with sudden night; and birds be in danger of perishing. The wise Author of nature has prevented all this, as by means of twilight we pass gently and gradually from day to night.

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JULY XIX.

The Ephemeral Fly.

THIS insect is called ephemeral, on account of the short duration of its life in the state of a fly. It is one of the prettiest sorts of little flies. It undergoes five transformations. First, the egg contains the principles of its life. It comes out a caterpillar, which turns into a chrysalis, afterwards into a nympha, and ends in being a fly. This fly lays its eggs on the water, where the heat of the sun hatches them. Each egg produces a very small red worm, which winds about as it moves. They are found all summer in great abundance on ponds and marshy places. But, as soon as the water begins to grow cold, the little worm makes itself a bag, or a little house, where it passes the winter. Towards the end of that season it ceases to be a worm; it enters into its third state, and is transformed into a chrysalis. It sleeps then till spring, and becomes by degrees a pretty nympha, or a sort of mummy, sometimes in the form of a fish. On the day of its metamorphosis, the nympha at first appears lifeless, and without motion. At the end of six hours the head shews itself, and rises by degrees to the surface of the water. The body afterwards disengages itself slowly and gradually, till at last the whole animal comes out of the shell. The new-born fly falls on the water, and remains motionless for some minutes. By degrees it begins to revive, and feebly stirs its wings. Then it moves them quicker, and tries first to walk, and then to fly. As these flies are all hatched nearly at the same moment, they are seen in swarms jumping and playing on the surface of the water for two hours. The male and female then seek each other for two more hours.

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Afterwards they begin again to skip and play, lay their eggs, and soon after fall down and die. Thus they finish their short life, at the end of five or six hours, and never do they survive the day that gave them birth.

Let the history of these little animals teach us how false a judgment we form of the duration of our lives in comparison of eternity. Suppose that one of these flies had preserved its active and laborious life for twelve hours, and, of course, had arrived at extreme age, according to their nature, and in comparison with its companions, who had most of them died at noon. If this old insect could speak, perhaps a little before its death, towards sun-set, it would address the following discourse to the friends assembled round him: "I now see, that even the longest life must end at last. The term of mine is arrived, and I do not regret it, for old age began to be a burden to me; besides, I no longer saw any thing new under the sun. All that I have seen during the course of my long life has taught me, that there is nothing certain or durable here. A whole generation of ephemerals have been destroyed by a violent storm. The coolness of the air has carried off numbers of young people in their bloom. I lived in the first ages of the world. I have conversed with insects much more respectable, robust, and better informed than any of the present generation. I can also assert for truth, that the sun which now appears so near the earth, I have seen it in the middle of the sky. Its light was formerly far more brilliant than at present, and our ancestors were much more sober and virtuous than we are. I have seen many things. I have a long experience; and have outlived all my contemporaries. My life began exactly when the sun was rising. During years without number it has traversed the sky with majesty, and everywhere spread its benign warmth. But now that it is

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upon the decline, and going to set, I foresee that the end of all things draws nigh. O my friends! how I flattered myself formerly that my life would be eternal! How beautiful were the cells I had made to live in! What hopes I founded on my good constitution, my strength, my activity, and the use of my wings! But, after all, I have lived enough, and none of those I leave behind me will run so long and happy a course as mine." Thus might an insect speak, which had lived near twelve hours upon earth. But might not a man, who had lived fourscore years, hold nearly the same language. The difference between twelve hours and fourscore years is nothing, when compared with eternity. Do we, in general, make a better use of our fourscore years, than the fly does of its twelve hours?

JULY XX.

Nothing perishes in Nature.

IF there was any thing in the world which perished, without being of use, one might doubt the wisdom of God's government. But we have reason to suppose, that, throughout the immense circle of the creation there is nothing lost, not even the smallest grain of dust; but that every thing exists for certain purposes, and that each answers in its way the design for which it was created. The seed which falls from a flower is not destroyed. It is often carried away by the wind to make other flowers fruitful, or it takes root in the ground, and becomes a tree. Other seeds or fruit which fall are eaten by birds and other creatures. They mix with their juices, and go through digestion, and the necessary preparation to make manure for the fields, for the use of men and animals. Certain things, it is true, corrupt and dissolve;

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but then they become parts of some other substance, and serve, under a new form, the designs for which they would not have been proper in their former state; because, in order to do so, they required being prepared by different transformations, and by mixing with other substances. The butterfly would not have produced a butterfly, if it had not at first been a worm. No animal whatsoever, such as we see them, could have existed, if the seed had not pre-existed in the first animal of its kind. Nothing then in nature is lost. Things are only separated or dissolved, in order to appear in a new form, and to become parts of some other substance. Each grain of dust may be called the seed of a new creature, and holds its place in the chain of beings which has been produced for the perfection of the whole. If you take a handful of the sand you tread on, you perhaps destroy the lives of a million of insects which inhabited those grains of sand. If we were better acquainted with the inside of things, we might determine, with more certainty, what the other substances were, in which they were in a manner concealed before, and into the composition of which they entered. But abortions, or children who die in the birth, ought they not to be considered as creatures that perish without having been of use?—Certainly not. They fulfil (in their way) the design of the Creator, and are prepared by many changes for their future state. Nature does nothing at one step. Man was first a child, the tree a shrub. Each creature exercises its powers during its short duration, and prepares itself for a new state. The step that man must take to pass from the mere sensitive life of childhood to the rational life of a riper age, is certainly not greater than that which the child must take in its mother's womb in learning to feel. And we can no more say that such a child has not answered the purpose for which it was created, than we can say it

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of a man, because he may not here below have answered some designs which he is not to fulfil till he becomes an inhabitant of heaven. Each creature fulfils, in its way, and in proportion to its faculties, the end proposed. Like the wheels of a watch, some move quick, others move slowly; but all tend, in a nearer or more remote manner, to the great end of their existence, and contribute, according to their power, towards the general plan formed by God. We may meet many things in nature, which will, at first sight, appear useless, and consequently to have been produced without design. We may imagine that others have been entirely destroyed or annihilated. But let us not judge rashly, or too readily blame the ways of Providence. Let us rather believe that all we behold, however strange and unconnected it may appear to us, is planned most wisely; and that God fulfils his designs, even when we, blind and ignorant mortals, can form no idea of the end he proposes. Let us be assured, that the hand of the Lord has planned every thing with the highest wisdom. Let us look around; all are connected; every thing is in its proper place; and nothing is owing to chance. There is not a thing in the world useless, even when turned to dust. Nothing in Nature is lost. Nothing perishes, not even the smallest leaf, not a grain of sand, not one of those insects invisible to the human eye, not one of the seeds blown away by a zephyr. That stupendous firmament, where the sun shines with such dazzling lustre; that swarm of insects which play in the sun-beams, and which we breathe without knowing it, all appeared at the word of the Creator. All exist never to end. Every thing is right, every thing is perfect throughout the universe which the Almighty has created; and yet there are rash and presumptuous men who dare to criticise his works! Let us not imitate such madness. Let us glorify God, and secure our own

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peace, by believing that nothing which ever was created perishes.

JULY XXI.

Difference of Zones.

THE Creator having made our earth in the form of a globe, and having impressed upon it a double motion, it necessarily followed, that the regions of the earth must be different from each other, not only in respect to the temperature of the air, and the seasons, but to the animals and plants also. In certain countries there is but one season; the summer is continual there, and every day is as hot as our hottest summer days. Those countries are situated in the middle of the globe, and occupy the space called the torrid zone. The finest and richest fruit which nature produces grows there; and it is there in general where she most liberally pours forth her treasures. The days and nights are of equal length most of the year. There are, on the contrary, countries, where, during the greatest part of the year, it is so extremely cold as to be beyond our severest winters. It is but a few weeks in the year warm enough for the few trees and herbs which are there to grow or become green; and in those frigid zones, neither the trees nor the earth produce fruit which mankind could feed on. The greatest inequality of day and night is there: each of them last in their turn for whole months together. The two temperate zones, placed between the torrid and the frozen, occupy the greatest part of our globe. In those countries, four seasons appear more or less distinctly, according as they approach the torrid or the frigid zones. The *spring*, wherein the trees and plants bud and blossom, when the heat is moderate, and

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the days and nights nearly equal. The *summer*, during which the fruit of the fields and trees ripen, when the heat is more intense, and the days become visibly longer than the nights. The *autumn*, when the fruit and the seeds fall off, and the grass withers, while the night again becomes equal with the day, and the heat is daily abating. The *winter*, during which the vegetation of plants totally or partly ceases, the nights lengthen, and the cold more or less increases. The countries of the temperate zones are so situated, that, in those which are near one of the sides of the torrid zone, the seasons are directly contrary to those of the other temperate zone. When it is summer in one, it is winter in the other, &c. In these parts, nature shews more variety in the produce of the earth, and in animals, than elsewhere.—Wine is peculiar to these countries; for the vine cannot be cultivated, either in intensely hot, or severely cold climates. Mankind, in particular, have advantages under such climates. The inhabitants of the frigid zone are stupid, are short in stature; those of the torrid zone are of a weak constitution, have warm passions, and have less natural and intellectual powers than the inhabitants of the temperate zones. However varied the regions of our earth may be, the Creator has provided for the happiness of all who inhabit them. He ordains that each country should produce what is most requisite, according to the nature of the climate. A worm, which feeds on the leaves of the mulberry tree, spins for the people of the torrid zone a web, from which they take silk for their clothing. A tree, as well as a shrub, bears a kind of husk or shell full of fine wool, with which light stuffs are easily made. On the other hand, the cold regions abound in quadrupeds; the skins of which serve for pelisses to the inhabitants of the north; and they are furnished with thick forests which sup-

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ply them with abundance of fuel. That the blood of the inhabitants of the south, naturally heated, may not be too much inflamed, their fields and orchards give them cooling fruits, in such plenty that they may send ample provision of them to other countries. In cold climates, God compensates for the want of the produce of the earth, by the great quantity of fish contained in the sea and lakes, and by the number of animals they have. Animals which indeed live in the forest, and are subjects of terror to man, but, at the same time furnish him with the finest furs, good food, and many materials for domestic use. Thus, there is no region in our globe that does not feel the greatness and goodness of the Almighty. There is no country, however barren and poor we may suppose it, where nature is not bountiful enough to provide, not only the necessaries, but the comforts of life.

In every place, O beneficent Father! thy wisdom and goodness may be traced. Even the impassable deserts, and the steep mountains of Asia and Africa, contain monuments of thy wisdom and bounty.

JULY XXII.

Singularities of the Sea.

THE sea is generally considered only in a terrible light, without reflecting on the wonders and blessings it so visibly presents to us. It is certainly true, that the sea is one of the most dreadful elements when its waves swell mountain-high, and the tempest roars. It then often drives the ships out of the road, and dashes them so violently, that they fill with water, and are swallowed up. Sometimes the storm drives them on banks of sand or rocks, where they are dashed

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to pieces. The whirlpools, or those masses of water which make the ship turn rapidly round with their current, and end in sinking or swallowing them up; those whirlpools are occasioned by great cavities in the sea, where rocks and different currents meet. No less dangerous are the water-spouts which the wind raises from the sea up to the sky. They hover in the air above the ocean, and the wind whirls them round with violence. They often burst with great noise, and do much mischief; for they approach a ship, fill the sails, and carry it away, then let it fall again, and dash it to pieces, or let it sink to the bottom. At least, if they do not carry it away, they break the masts, tear the sails, and sink the ship. Several vessels perish in this manner. But we should be very ungrateful to attend only to the mischief the sea does us, without deigning to reflect on the magnificent works of the Lord, and on his goodness, which shines forth even in the depths of the abyss. The first thing worthy of remark is the saltness of the sea. It is such, that a pound of water contains two ounces of salt. The sea-salt appears lighter than what we use in common; and yet it is not drawn into the air, nor does it diminish by the continual flowing in of sweet water. The cause of this is not known. There may be mountains of salt in the sea; but if so, the sea would probably be more salt in some places than in others, of which we have no certain proof. It is possible that torrents and rivers carry into the sea saltpetre and salt particles; but what would that be in such a vast extent as the ocean? This salt quality, however, be the cause of it what it may, was necessary for several purposes. It prevents the water from corrupting, and contributes to make it heavy enough to bear the greatest burdens to be conveyed from one place to another. The colour also of the sea-water deserves our observation. It is not the same every where. Besides, that in all

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water the colour of the bottom and of the sky appears in it, that it is black in deep abysses, white and foaming in a storm, silvered and gilded over, clouded with the most beautiful colours, when the rays of the setting sun shine upon it. Besides all this, the different insects, marine plants, the mixture of many things which the rivers wash into the sea, vary its colour here and there. When it is calm, it sometimes appears strewed with brilliant stars. The tract of a ship, which cuts the waves, is often luminous, and seems a river of fire. These phenomena must be partly attributed to sulphureous particles, oily and inflammable substances in the sea, and partly to shining insects. One known property of the sea is the flux and reflux. Every day, or rather in the space of 25 hours, the sea twice rises and falls. When the tide rises it is the flux; and when it falls it is the reflux. This phenomenon is attended with several remarkable circumstances. There is always a flux and reflux at the same time in two parts of the globe, and those are opposite to each other. When our antipodes have high tides, ours are the same. The tide is always lowest when we are in the first and last quarter of the moon; and our highest tides are generally three days after the new or full moon. However, it may proceed from accidental causes, that the tide is sooner and higher one time than another. Though this phenomenon has not hitherto been perfectly accounted for or explained, it is still certain that great advantages result to us from it, both in purifying the water, and being useful for navigation.—And wonderful as this is, there is much more to interest us. The creatures of which the sea is full might alone excite our wonder and admiration. Here a new world appears, and the number of beings of which it is composed is prodigious. The aquatic animals are not indeed so varied in their species as the terrestrial; but they sur-

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pass them in size, and their life is longer than those of the earth or air. The elephant and ostrich are small in comparison of the whale, which is the largest fish the sea contains. Its length is often from 60 to 70 feet. It lives as long as an oak, and consequently no land animal's life can be compared to it. If we give credit to certain accounts, there are still larger animals than the whale in the sea; a sort of lobster, called *kraken*, in the Northern Seas, which is said to be half a German mile in circumference. Who could ever give a list of the several sorts of animals which live at the bottom, and towards the surface of the sea? Who could tell their number, describe the form, construction, size, and use of these different animals? How infinitely great is the God who created the sea! This is the conclusion we must naturally draw from such reflections. It is not without very wise reasons that the Creator ordained that the ocean and seas should occupy about two-thirds of our globe. The seas were not only to be the great reservoirs of water, but also, by means of vapours which arise out of them, were to become sources of rain, snow, and other such meteors. How much wisdom there appears in the connection the seas have with each other, and the continual motion the Creator has impressed upon them! It is no less worthy of observation, that the bottom of the ocean is of the same nature with the surface of the terra firma. There are found in the sea, rocks, valleys, caves, plains, springs, rivers, plants, and animals. The islands in the sea are only the tops of a long chain of mountains. And when we consider that the sea has been less examined than any other part of the globe, we have reason to believe that it contains still a number of wonders, to which neither the understanding nor the senses of man are adequate; but which all prove the power and wisdom of God. Let us then adore him who has

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every where, in the ocean, as well as upon earth, fixed monuments of his greatness.

JULY XXIII.

Several Shades observable in Flowers.

WITH a heartfelt pleasure I cast my eyes around, and every where discover the nunberless beauties the creation affords. What a lovely assemblage of colours I behold! How pleasing and how varied the mixture! What wonderful art in the disposition of those shades! There, a light pencil seems to have laid on the colours: here, they are blended according to the most exact rules of art. The colour of the ground is always such as best throws out the drawing, whilst the green, which surrounds the flower, or the shade which the leaves cast upon it, serves to set off the whole. In thus distributing and varying the colours, our gracious God seems to have had no other view than to procure us agreeable sensations.

Lord! How great and numerous are thy works! Thou hast wisely ordained all things. I admire the greatness of thy designs, and still more the wise means Thou makest use of to fulfil them. It is with difficulty that men compass any one work. After many vain efforts, we sometimes arrive at a tolerable imitation of one single work of nature. But Thou, O Supreme Power! in a single moment, Thou hast given existence to millions of beings, and created them in a state of perfection. The more we examine works of art, the more defective they appear: but though thy great works have been contemplated for thousands of years, a single fault could never be found in the plan, nor could any thing be imagined more perfect than the manner in which they are executed.—The

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more we observe the works of God, the more their beauty charms us, and we continually discover new marks of greatness in these masterpieces of a divine hand. For my part what most delights me, in the shades and colours of flowers, is their simplicity. One would suppose that the Creator must employ an infinite number of materials to embellish nature in such a manner, and to distribute amongst the flowers and plants so many bright, rich, and beautiful colours. But God has no occasion for painful exertions to make the creation a scene of wonders. One single element under his hand assumes variety of beautiful forms. The moisture of the earth and air penetrates into the fibres of blants, and there filters through a train of transparent stalks. This is what works all the wonders, and produces all the beauty, we behold throughout the vegetable kingdom. It is the sole cause of the charms, the perfume, and growth of flowers. If each colour had its particular cause, the surprise of the spectator would lessen: but we contemplate with pleasure, and can never tire of admiring the effect of a profound wisdom, a work which, though varied in its parts, is still simple in respect to its cause, and wherein we behold a multitude of effects depending on one single spring, which always acts in the same manner. At this moment, while I examine the variety of tints which colour the flowers, I feel more than ever the value of the reason with which I am endowed. Without that faculty, I should be deprived of the enjoyments they afford, and flowers would exist in vain for me. But my reason points to me the numberless beauties of flowers, the infinite variety of the colours and shades, which the fields, the valleys, the mountains, and the forests, present to us. I not only know them, but am sensible of their beauty, and take a pleasure in them. I can do

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still more: I can from each flower raise my thoughts to the Creator, and find, even in their colour, traces of his perfection. How can I sufficiently express my gratitude for the gift of reason, that enables me to enjoy these beauties of nature, these wonderful works of God!

JULY XXIV.

The Great Heats in Summer.

IT is generally at this time we experience the greatest heat. Perhaps it may appear extraordinary to be told that the sun, which now enters into the sign Leo, daily removes from us. When we were nearer to the sun, the heat was temperate, and now we are removed farther from it, the heat is at its height. This phenomenon agrees, however, with the laws of nature; and it is in the plan of our globe that we must seek for the reason of it. The sun was nearer to us lately, but as its rays were not strong enough to penetrate deep into the earth, we could only perceive a moderate warmth; yet, in the space of some weeks, the earth and the bodies upon it are so far heated, that even a less degree of the sun produces more effect than in the beginning of the summer, when it acted upon cold bodies. This plan of nature displeases many; they complain of this burning heat, which weakens us, and makes us incapable of much labour. But is it not unreasonable to murmur at a plan which, being founded on the immutable laws of nature, is of course inevitable? Is it not ungrateful to our heavenly Father, to blame his government, which in the end never fails to produce the welfare of the world? And can any one seriously wish this season less hot? Because the heat is inconvenient, would we therefore wish the fruits,

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which are to serve for next winter's food, not to ripen! I repeat, that our murmurs are ungrateful to the Creator, who softens and compensates for every evil, by certain advantages annexed to them: for example, the inhabitants of the western parts of Africa, and particularly those of Cape Green, and the island of Goree, are exposed the whole year to the intense heat of the sun; but their bodies are so formed, that their health does not suffer from it; and the winds, which blow continually in those countries, serve to temper and cool the air. Is it probable that the Creator should shew less goodness to us in this respect? O how unpardonable, if ever we are insensible to the proofs he gives us of it, even when we are oppressed with heat? Is it not, in the first place, an effect of his tender mercy, that the summer nights are so calculated to cool the air! The nights bring with them a coolness which prevents the air from dilating, and enables it to act so much the more forcibly on every thing. One single night revives the languishing plants, gives new vigour to the weakened animals, and so refreshes us, that we forget the weight and fatigue of the day. The storms even which terrify us, are means, in the hands of the Creator, to cool the air, and moderate the heats. How many fruits also are there of a cooling quality, which abate the acrimony of bile! A relief so much the more valuable, as the poorest among us may enjoy it. Let us cease then to complain of the heat of the sun, or the weight of suffering we labour under. They both belong to the plan of Divine Wisdom.

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JULY XXV.

Several Things remarkable in Animals.

OF all parts of nature, it is the animal kingdom which affords the greatest wonders; and, to a lover of natural history, the different instincts and properties of animals are a very interesting study. But to a reflecting being, it is something more than merely an agreeable object. The animal operations teach him to trace them back to a wisdom he cannot fathom, because it surpasses all human conception. This is the effect I wish to produce, by pointing out the singularities observable in certain animals. The manner in which birds and insects lay their eggs is worth remarking. The grasshopper, the lizard, the tortoise, and crocodile, never trouble themselves about their eggs, nor the young ones that are in them. They lay their eggs in the earth, and leave to the sun the care of hatching them. Other animals, by a natural instinct, lay their eggs in places where the young find food the moment they are born. The mothers are never mistaken. The butterfly, proceeding from the cabbage-caterpillar, will not lay its eggs on meat, nor will the fly which lives on meat, lay hers on cabbage.—Certain animals are so careful of their eggs, that they carry them with them wherever they go. The spider, called the *wanderer*, carries hers in a little silken bag. When they are hatched, they range themselves in a particular order on their mother's back, who goes about with this load, and continues to take care of them for some time. Certain flies lay their eggs in the bodies of living insects, or in the nests of those insects. It is well known that there is not a plant which does not serve to feed and lodge many insects. A.

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fly pierces through an oak-leaf, and lays an egg in the hole it has made. This wound quickly closes. The place it was in swells, and there soon appears upon it an excrescence, which they call the gall-nut. The egg that was contained in the growing gall-nut, grows with it, and the insect finds both lodging and food as soon as it is born. The care of animals for their young is scarce credible; and their love of them sometimes surpasses their love of life. With what tenderness the quadrupeds nurse their young! They cure their wounds by licking them; they convey them from one place to another, when any danger threatens; they keep them close to them, defend and guide them. If they are carnivorous, what pains the mother takes to get them meat! With what art she teaches them to catch their prey, to amuse themselves when they have got it, and then to tear it in pieces. It is impossible, without emotion, to read the account of a bitch who, while they were dissecting her, still continued to lick her young ones, as if to seek relief from her sufferings in this maternal care, and cried out lamentably the moment they were taken from her. The sea-dog, during a storm, conceals its young under its belly; from whence they come out again when the fright is over. Each species of animals has its peculiar inclinations and wants. The Creator provides for both. Let us, for example, consider those which are obliged to seek their food in the water, and particularly the aquatic birds. Nature has covered their wings with a gluey oil, through which the water cannot penetrate; by this means, they are not wet in diving, which otherwise would prevent their flying. The proportion also of their bodies differs from that of other birds. Their legs are placed more behind, that they may stand up in the waters, and stretch their wings above it. To enable them to swim, their feet are furnished with webs.

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For the purpose of diving, they have received a particular form of body; and, for that of seizing their prey, nature has provided them with large bills and long necks. In a word, they are formed as their way of life requires they should be. The nautilus is a sort of shell-fish, something like a snail. When it wishes to ascend, it places itself on the forepart of its shell; and, to make itself lighter, it throws out the water. If it wishes to descend, it withdraws into the bottom of its house, which then fills with water and becomes heavy. If it wishes to sail, it artfully turns its shell, which becomes a little gondola, and then it stretches out a thin slight membrane, which swells in the wind, and serves as a sail. Perhaps it is from the nautilus that mankind have learned the art of navigation.

It is with the actions of animals as with their make. The same wisdom which formed their bodies, their limbs, and appointed them a common use, has also planned the different actions we see them perform and directs them towards that purpose for which they were created. The beast is led to it by the invisible hand of its Creator. It produces works which excite our admiration, and appears to act from reason. It stops when necessary, plans its work according to circumstances, and yet only follows certain secret springs, which make it move. It is an instrument which cannot judge of what it executes, but is directed by the adorable wisdom of our Creator, which has circumscribed each insect, as well as each planet, within a sphere from which it cannot deviate. When, therefore, I observe the instinct and the industry of animals, I feel a sentiment of veneration, and think I behold a scene where the Almighty Author conceals himself behind a curtain. But whoever reflects seriously on the works of nature, will every where discover the finger of God, and the examination of the won-

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derful construction of created beings will fill him with constant gratitude and respect for the Creator.

JULY XXVI.

The Human Face.

EVEN the outward part of the human body declares the superiority of man over every other living creature. His face, directed towards the heavens, proclaims his dignity, which is so far imprinted on his features, that one may in some measure judge from the countenance of man what the importance of his destination is. When the soul is in a perfect state of tranquillity, the features are calm and composed; but when the soul is agitated and disturbed, the countenance becomes a lively picture, wherein the passions are painted with equal force and delicacy. Each affection of the mind has its particular impressions, and each change in the features is the characteristic of the most secret emotion of the heart.—The eye, in particular, so visibly expresses them that we cannot mistake it. It is more immediately the organ of the mind than any other. The most turbulent passions, and the gentlest affections, are painted with great exactness in that mirror. The eye may therefore be called the true interpreter of the soul, and the organ of the human understanding. The colour of the eyes, their motions, more or less quick, contribute much to mark the character of the countenance. Although the eye appears to go several ways, it has, in fact, but one manner of moving, which is the turning round its centre. Our eyes are in proportion nearer to each other than those of any other living creature.

In most animals, the space between is so great

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that it is impossible for them to see the same object at once with both eyes, unless it should be placed at a great distance. The eye-brows and eyes principally form the countenance. Those parts being of a kind quite different from the rest, their particular colour makes them more striking than the other features. The eye-brows are the shade of the picture, which throws out the drawing and colouring. The eye-lashes, when they are long and thick, contribute much to the beauty of the eye, and give it a more pleasing look. It is only mankind and monkies, who have both eye-lids adorned with eye-lashes. Other animals have none on the lower eye-lid, and man's upper eye-lid has more than the lower. The eye-brows have but two sorts of motions, which are performed by the assistance of the muscles of the forehead. By means of one they rise, and by means of the other they fall down and draw together. The eye-lids guard the eye, and prevent the cornea from drying. The upper one can of itself rise and fall. The under one moves but little. Though we can at will move our eye-lids, it is not in our power to keep them open, when fatigue and sleep weigh them down. The forehead is a very important part of the face, and adds considerably to its beauty, if it is well proportioned, neither too full nor too flat, too large nor too small, and if the hair growing well, forms the outline and ornament of it. The nose is the part of the face which projects most, but is the least moveable; and as it is seldom put in motion, but in violent passions, it serves more for the beauty of the whole than for any expression resulting from it. The mouth and lips, on the contrary, are susceptible of many changes; and, next to the eyes, it is the mouth which best expresses the passions, by the variety of forms it assumes. The organ of the voice, also helps to animate and set it in play. The red colour of the

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lips, and the whiteness of the teeth, add to the charms of the face.

We have hitherto only examined the human face relatively to the regularity and beauty of the parts which compose it, without discovering the use and several purposes of those parts. But under this one point of view we already perceive the infinite wisdom of Him who has, throughout all his works, united the useful with the beautiful.

JULY XXVII.

On the Gravity of Bodies.

GOD has endowed bodies with a force which acts at all times, in all places, and in all senses. If a body endeavours to move towards one point more forcibly than to another, we say that it gravitates towards that point. For experience teaches us that bodies are inclined to descend; or, that if they are far from the surface of the earth, without support, they fall on it in a perpendicular line. It is by no means in the body itself that we must seek the cause of its weight; for a body which falls remains in the state it was put, till some exterior cause changes it. It is equally impossible that the air should occasion this gravity, since being itself heavy, it ought rather to lessen the swiftness of the fall of bodies. We must therefore seek the cause elsewhere. Perhaps the opinion nearest truth, is that which supposes the earth to have the virtue of attracting bodies placed at a certain distance, as the magnet attracts iron: Or else possibly it may be imputed to a foreign substance distributed throughout all bodies. But though we cannot positively ascertain the cause of weight, nothing is more evident than the advantages which accrue from it. Without it we should not be able to move as we do. Our centre of gravity is

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about the middle of our bodies. When w
the right foot, we make the left to be the c
if we then bend our body forward, we ar
falling; but by putting out the right foot, v
vent the fall and make a step. Thus our w
in some respects, a continual course of falls
ing which the centre of gravity is preserv
tween our feet. This is the reason we be
ward in going up a hill, and backward in c
down it. We also lean forward when we c
load on our shoulders, and backward wh
carry it before us. All this is according
laws of gravity, which govern the motions
mals when they walk, swim, or fly. Thes
laws govern the motions of the immense
which roll in the firmament: the sun a
the planets, and each planet in its turn attr
satellites: or, what is just the same, the p
gravitate towards the sun, and the satelli
wards the planets; for a body made to turn
always flies in a direct line from its centr
meets with no obstacle in its way. It is wi
greatest swiftness that the planets run their c
and the moon is not fastened by a chain
earth. It seems, then, as if a motion so ra
that of the moon, must throw it very far fr
in the immeasurable space, if there was not
which continually pushes it towards our glo
which counteracts the force that removes i
hence. That first force is the gravitation
moon towards the earth. If our earth was
lighter or heavier than it is, what would
consequence? It would either draw too n
too far from the sun. In the first case, th
would be insupportable; and in the latte
cold would be equally so: every thing in our
would be consumed or frozen. What woul
become of the seasons, and a thousand thi
indispensible for man, and so necessary
happiness?

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Here again, then, O Supreme Wisdom! I find a monument of thy wonders. By a means so small in appearance, thou givest motion to the celestial bodies, and to all animals. By the laws of gravity alone, thou preventest the least grain of sand from being lost upon this or any other globe. But it is in this that the greatness of thy power and wisdom consists, that often the greatest and most astonishing effects are produced by means that appear to us the most insignificant.

JULY XXVIII.

Number of Effects in Nature proceeding from one and the same Cause.

THE whole of nature is one endless chain of causes and effects; and as all parts of the universe are connected together, each motion, each event, depends on a preceding cause; and will, in its turn, become a cause of the effects which follow it. The whole constitution of the world may convince us that it is not chance, but a divine power, and a wisdom beyond all conception, which first erected this wonderful fabric, and impressed motion upon its different parts, and regulated the great chain of events depending on and succeeding each other. This degree of knowledge is not difficult to acquire; for though that which we have of nature is very limited, we still see numberless important effects derived from causes evident to the human understanding. Many natural phenomena may furnish examples of this. What variety of effects does the heat of the sun visibly produce? It not only contributes to preserve the life of multitudes of animals, but also to the vegetation of plants, the ripening of corn and fruit, the fluidity of water, the exhalation of vapours, and formation of clouds, without which neither rain nor

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dew would fall upon the earth. The air likewise is so constituted as to fulfil several purposes at once. By means of this element the animal bodies are preserved, the lungs are relieved, and all the vital motions acquire force. It is the air which kindles fire, and nourishes the flame. The air, by its motion and undulation, conveys every sort of sound to the ear. It gives a spring to the winged animals, and enables them to fly from place to place. It opens to man an easy passage through the seas, the vast expanse of which he could not otherwise cross over. It is the air which supports the clouds in the atmosphere, till becoming too heavy, they fall again in rain. It is the air which prolongs the day by morning and evening twilights; and without it the gift of speech and the sense of hearing, would be useless to us. All these blessings, and many more, depend on the formation of the air in which we live and breathe. This wonderful element which surrounds our globe, which is too subtile to be visible to us, and yet so strong that no element can resist its force, is it not a striking proof of the wisdom of our Creator? The force of gravitation alone, which exists in every thing, holds the earth firm, preserves the mountains, and renders water fluid. It confines the ocean in its depths, and the earth within the circle prescribed. It maintains each being in its place throughout all nature, and preserves between the celestial bodies the proper distance from each other. Who can describe the many properties of water! In general, it serves to dilute, to soften, to mix a great many bodies which we could not otherwise make use of. It is the most wholesome drink: it is the best nourishment for plants: it turns mills and several other machines: it procures us fish, and brings on its surface the treasures of another region. How various and innumerable the effects produced by fire! Solid bodies are either melted

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and made fluid, or become again solid bodies of a different sort. It makes fluids boil, or reduces them to a vapour, and gives heat to all other bodies, and contributes to give sensation of sight to living creatures.

It is not only in the natural world that we see the greatest variety of effects produced by the same cause: in the moral world also, one single disposition of the mind produces no less variety of effects. Let us, for example, consider the natural inclination we have to love one another. From hence is derived the care of parents for their children; social ties; the connection of friendship; patriotism; goodness in those who govern, and fidelity in those who obey. Thus, one single propensity keeps each individual in the circle prescribed, and forms the bond of human society; is the principle of all virtuous actions, of all laudable pursuits, and of all innocent enjoyments. All these are most evident proofs that the world is not made by chance; neither are the materials which compose it without connection or relation to each other. On the contrary, the world forms a regular whole, which Divine Power has ordained with infinite wisdom. In each part, in each phenomenon of the visible world, we discover traces of it. Yet there is much more which escapes the deepest observations of the greatest capacities; for we cannot trace it in all its different lights.

JULY XXIX.

Some Maladies in Plants.

VEGETABLES are subject to several maladies. Sometimes they are covered with a whitish matter, which sticks to them like dust. It does not proceed from insects, as is generally believed, but from a natural stagnation in the juices, and a beginning

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of corruption, which attracts the insects, and invites them to lay their eggs upon it. The stagnation of the juices is the first stage of corruption; and it is supposed that this alone is sufficient to attract insects, because they are seen swarming by millions, as soon as the circulation of juices is stopped in a tree, either by natural or other causes. This is the reason that the weakest and worst situated trees are the most frequently subject to this malady. If the insects were the cause of it, it could not be produced by art; whereas if a tree is wounded designedly, or by neglect, it will immediately bring the mildew. On a tree, thus weakened by art, millions of insects settle at once, while the neighbouring trees are free from them. Therefore this corruption should no more be imputed to insects than that of meat; it is caused by the stagnation of the juices, an accident which many circumstances may occasion. There is often something resembling dew, but which is glutinous, sweet, and corrosive, that burns and spoils the plants. It was imagined that the insects conveyed this glutinous juice into vegetables, or that the bees carried their honey there. But, after many experiments, it is now allowed to be ascertained, that this matter falls from the air in the form of dew. In some countries it lies in little drops on a number of vegetables of different sorts, without distinction; and, in the space of a night it covers almost all the leaves of a long row of trees, on which there was none before. Perhaps this dew is formed from vapours, rising from flowers and blossoms of trees, out of which the bees extract such good honey; and if it falls more in one place than another, it is owing to the direction of the wind. Perhaps, also, this matter may be the effect of malady in the plants, when the juices are hurt, which may attract insects, like the dust before mentioned; for it is the boughs, branches, bushes, and weak trees, that

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most frequently suffer from this malady. It is also observed, that the leaf on which this sort of dew falls, spots, blackens, and spoils; and very possibly this substance may be the cause of it.

Here, again, we find traces of the wisdom of the Creator; for, as the insects require food to live upon, it is for our benefit they should be obliged to seek it in vegetables, which, being spoiled, are become useless or hurtful to us. To this we owe that the animals do not deprive us of food, but choose what would be hurtful to us. It is true, that, according to the course of nature, each plant, each tree, and even each animal, serves to support some kind of animal. We revenge ourselves on the species which hurts us, and seek as much as possible to destroy them. Perhaps we should be more disposed to spare them, if we considered how little real harm they do us.

JULY XXX.

Means of Subsistence which Nature affords to Animals.

IT is one of the great effects of divine goodness and power, that there is every where food enough to maintain all the living creatures with which the world is filled. It is not indeed wonderful that the countries under the temperate zone should furnish subsistence for those that live there; but that it should be the same every where else, even where it could be least expected to find food and pasture; and that such different kinds of animals should never fail of provisions, can only be attributed to the care of a wise and beneficent Providence.

God has proportioned the food to the number and wants of the animals which are to consume

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it. It is almost every where to be found in abundance; but not in such profusion as to corrupt, which would be an evil to us. What is most remarkable in this is, that among so many sorts of food, the most useful and necessary are in general the most common, and multiply most easily. As there are a great many creatures which feed on grass, there are great numbers of fields covered with grass, herbs, and salubrious plants, which grow of themselves, and resist the inclemency of the air. Is it not worthy our attention, that corn, the principal food of man, can be so easily cultivated, and so astonishingly multiplied? For example, a bushel of wheat, if sowed in a good soil, may produce an hundred and fifty bushels. Is it not by a most wise direction of the Creator, the taste of animals is so different, that some love to feed on herbs, others on corn, others on meat, worms, insects? &c. Some are content with a little, others are almost insatiable. If all sorts of animals fed on the same thing, the earth would soon become a vast solitude. This diversity of taste among beasts is a certain proof that it is not by chance they like such and such food, but is owing to a natural instinct, which inclines them to food adapted to the nature of their bodies. By this means all the productions of earth and sea are well disposed of. Not only every thing that breathes is richly provided for, but even that which, by corrupting, might prove a nuisance, serves useful purposes. For the most wholesome plants would perish, the carcases of fish, birds, and beasts would exhale a destructive poison, were it not for the wise direction of the Creator, who ordained that different animals should choose these things for their food.

Food spontaneously offers itself to most beasts; but they require the art to discern it, and must be prudent and cautious. Their provisions are so prepared, that what is useful to one species is

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hurtful to another, and turns to poison. Botanists have found, from several experiments, that cows eat of 276 sorts of grass, but that they reject 218; that goats make use of 449, and that there are 126 which they do not touch. Sheep feed on 387, and there are 141 which they do not eat. The horse grazes on 262, and rejects 212. Swine are content with 72 vegetables, but there are 171 which they will not make use of. Other animals are obliged to seek their food with labour and afar off, to dig for it in the earth, or to collect it from a thousand places where it is scattered about, or even to bring it out of another element. Many are obliged to choose the most favourable time of night to satisfy their hunger in safety; others to prepare their food, to pick the seeds out of their shells, to bruise them, if hard, to swallow little stones to assist digestion, to take off the heads of insects they feed on, to break the bones of their prey, to turn the fish, in order to swallow them, by the head. Many would perish, if they did not convey future provision to their nests. Others cannot catch their prey, without laying snares, or digging holes for them. Some pursue their prey on land, others in the air, and under the water.

The more varied the food of animals, and their manner of procuring it, the more admirable is the wisdom and goodness of God in their preservation.

JULY XXXI.

Variety in the Stature of Man.

THE entire height of the human body varies considerably, and the more or the less is of little consequence. The usual height is from five to

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six feet. Some people, who live in the northern countries, along the frozen seas, are less than five feet. The least people of those known to us inhabit the tops of the mountains in the island of Madagascar; they are scarce four feet high. Many of these dwarfish people came originally from nations of a common stature; and the cause of their degeneracy must certainly be imputed to the climate they inhabit. The extreme cold most of the year there, makes both animals and vegetables small; why should it not have the same effect on man? On the other hand, there are whole nations of a gigantic size: the most famous of them are the Patagonians, who live near the straits of Magellan. It is asserted that they are from eight to ten feet high. Neither ought it to appear to us impossible, that there should be people taller than the Europeans. Besides the traces that remain of it in history, and in the monuments of antiquity, there have been seen, even in our climates, men sometimes above six feet and an half high; who were, notwithstanding, well proportioned, healthy, and capable of all the exercise and labour which require strength and activity.

Adorable Creator! thy wisdom is evident also in these varieties of human nature. All that Thou hast brought forth in the animal, vegetable, and mineral kingdoms, has been done by weight, number, and measure. Every thing bears thy stamp: the dwarf as well as the giant; the blade of grass as well as the oak: the worm as well as the elephant.

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AUGUST 1.

Meditation on the Works of Nature.

FATHER of the universe! Preserver of all that breathe! how great is thy Majesty, and how many wonders Thou shewest unto man! It is thy hand which hath stretched out the heavens and set them thick with stars. Now, at this moment, I behold the sun shining in all its splendour. To-morrow, perhaps, it will be no more for me that the birds make the woods, the fields, and the valleys, resound with their melodious notes. I feel that I am mortal; my life fades away like the grass of the field: It withers as a leaf fallen from the branch where it grew. Who knows when these words of the Almighty will be heard by me, "Man, return to dust!" When the grave shall have swallowed me up, when darkness and silence come upon me, when the worms have gnawed my flesh; what will then remain of my earthly possessions? Will not all be lost to me, though even all my wishes had been gratified, and I had here enjoyed unmixed happiness?—O how senseless should I be, were I to attach myself to the transitory blessings of this world! If I aspired to great riches, If I was ambitious of vain honours, and if, allowing myself to be dazzled by vain splendour, envy and pride should take possession of my heart; if too eager in my wishes, I have pursued what I ought not to aspire to, I humble myself before Thee, O God. Behold here I am, may that which Thou in thy wisdom directest happen unto me. Man, a being mad with pride, prescribes laws to his Creator! He dares to blame the decrees of Eternal Wisdom! And, Thou, Almighty Friend of man! Thou lovest them more than they love themselves, when thy

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goodness refuses them the deceitful enjoyments which are the objects of their wishes. When, in the morn, on the green turf, covered with dew, every thing presents me a cheerful prospect, and the wings of the night have cooled the burning heat of summer, Wisdom cries out to me, O mortal! Why dost thou harbour cares? Is not God thy Father? Art not thou his child? Will not he who made thee take care of his own work? The plan of thy existence is not limited to this earth; it takes in heaven. Life is but a moment: and the longest earthly felicity is but a pleasing dream. O man! thy destination is immortality. The thought of immortality raises us above the earth, the universe, and time. It shall awaken my heart, when seduced by false pleasures, I am inclined to quit the path of virtue. The roses which crown the head of the wicked soon fade. His shameful enjoyments dishonour him, and repentance succeeds them. I am but a sojourner upon earth, and none but immortal joys deserve pursuit.

AUGUST II.

Vegetation of the Blade of Wheat.

THE blade of wheat is composed of the principal stem, of the stalks growing out of the sides, and the stalks which afterwards spring out of those. It begins to form as soon as four green leaves make their appearance. If the little plant is then taken, and the under leaf is cautiously pressed, or separated, there will be seen a little white point which gradually grows into a stalk; and under the first leaf the little root appears. The white point springs out of the substance of a knob, opens into green leaves, and shoots out on the side a new point. But these several points, and the stalks they produce, are not all designed

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to bear fruit. Many of them wither and are lost. When the principal stem has taken growth, there is a considerable revolution in the plant, and all the sap is then employed in the formation of the blossoms and fruit. But before that, when the plant begins to vegetate, there are four, and sometimes six leaves, which spring from so many knobs. They prepare the nutritive juice for the ear of corn, which is seen in miniature, in spring, upon opening a stalk through the middle. Even in autumn this ear of corn may be seen, in the form of a little cluster, when the knobs are still very close together. When the plant begins to bud, the two upper leaves of the stalk join together, inclose the ear of corn, and protect it, till it has acquired some consistency. Before that happens, all the knobs, and particularly the two last, though soft, are very closely connected, and very little space between them. But as soon as the ear of corn has pierced through its coats, all its parts lengthen, and the leaves give them all the juices they contain. By degrees the knobs harden, and the under leaves dry up; and the juices which nourished them are no longer used but in strengthening the stem. After all these preparations, the blossoms appear. This blossom is a little white stalk, extremely slender, which comes from the juice of the grain. Several other little stalks surround it. They are at first yellowish, afterwards, they grow brown, and at last become blackish, a little before they fade and fall off. The chief use of these stalks is to nourish a little cluster, which is in the bag of grains. As soon as the corn has done blossoming, there appear grains, which contain the germ, and which come to perfection long before the mealy substance appears. This substance gradually multiplies, while the sap collects round a part extremely fine and delicate, like down. This down, which exists longer than the blossoms, serves,

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among other things, to support the opening of the principal pipe that goes through the corn. The fruit ripens as soon as it has attained its full growth. Then the stalks and the ear whiten, and the greenish colour of the grains becomes yellow or dark brown. These grains are still, however, very soft, and their meal contains much moisture; but when the wheat is quite ripe, it becomes dry and hard. The wisdom which appears in the construction and vegetation of corn, will appear even in the smallest blade. The leaves, for example, which surround it, before it has attained its full growth, even those leaves have their use; and it seems as if the wisdom of the Creator had placed them round the blade, for the same reason that an architect raises a scaffolding about a building, which, when the building is finished, he takes away. For as soon as the blade has attained its full length and consistency, the leaves which protected it dry up and fall off. Whole months pass away, before the ear of corn ventures to appear and expose itself to the air; but as soon as every thing is prepared for the formation of the blossoms and fruit, they all appear in a few days. With what skill also are the stalks and the ear of corn constructed! If the former were higher, the nutritive juice could not so well penetrate into them; if, on the contrary, the corn had been placed lower, the moisture would have made it spring up before it was reaped; birds and other animals would get at and destroy it. If the stem was weaker and smaller, the wind would break it; and if it was stronger and thicker, little animals might lodge in it, birds would perch upon it, and pick out the grain.

Merciful and beneficent Father! may all those who behold a field of wheat, and contemplate with pleasure the waving corn, may they ex-

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perience all the sentiments of love and admiration which thy goodness ought naturally to excite.

AUGUST III.

The Dog-Days.

THE sun, besides its diurnal motion, which appears to convey it from east to west, and which occasions the revolution of day and night, seems evidently to have another motion from west to east; by means of which, at the end of 365 days, it comes again near the same stars from which it had removed for six months, and to which it was drawing near the other six months. On this account, the ancient astronomers divided the seasons according to the stars which the sun meets in its annual course. They divide this course into twelve constellations, which are the twelve signs of the zodiac, called the twelve houses of the sun, because it seems to dwell a month in each of them. The summer begins with us when the sun enters the sign Cancer, which happens the 21st or 22d of June. It is then that the sun is raised at the highest above our horizon, and darts its rays almost directly upon us; and, of course, at that time begins the heat of summer, which always increases in the following month, by degrees, as our globe is more heated by the burning rays of the sun. This is the reason that July and part of August is generally the hottest part of the year; and experience has proved, that from the 20th of July to the 10th of August the heat is at the height. Now, of all the stars in conjunction with the sun, the dog-star is the brightest. Lost in the rays of the sun, it disappears from us for a month, as is the case with every star which the sun meets in its course, and

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the month of its disappearing is the time of the dog-days. These observations would be of little importance, were it not to remove a rooted prejudice among many people. An ancient tradition attributes the heat usually felt at this time to the influence of the dog-star upon the earth and its inhabitants. This opinion is proved to be absurd, from this circumstance alone, that the concealment of the dog-star, in the rays of the sun, does not take place in the time we call dog-days. Those days, properly speaking, do not in reality begin till the end of August, and they terminate towards the 20th of September. And as the dog-star, or the *sirius*, always advances farther, it will attain in time to the months of October and November. It will at last be found to fall in the month of January, and we shall then in the dog-days experience severe cold. When we reflect on this, we may plainly see that it is impossible this star should occasion the great heats which we suffer, or the effects they produce.—When, therefore, in the supposed dog-days, the wine or beer spoils in bad cellars; when things liable to ferment turn sour; when stagnated waters dry up as well as the springs; when dogs and other animals, and men also, are seized with madness; when we are attacked with disorders, which imprudence in hot weather draws upon us; this does not happen because a star conceals itself behind the sun. It is the extreme heat of the air, at that season, which is the sole cause of all those effects. Whoever can suppose that certain figures, which the imagination forms to itself in the sky, can have any influence on our globe, and on the health and reason of man, discovers great want of judgment. It is not the stars, it is generally ourselves, which we ought to accuse of the evils we suffer. If then there should be at those seasons dangerous maladies, let us not impute them to the influence of the dog.

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star, which is entirely chimerical! Let us rather believe they proceed from our misconduct, and neglect. If we consider the point seriously, we sin against a wise Providence, by indulging such prejudices. Can we suppose an infinitely good Being, the Ruler of the world, to have created any thing in the heavens, or in the earth, to be a torment and misery to his creatures? If we believe in such as an inevitable fatality, we cannot admit or acknowledge a Creator, the essence of wisdom and goodness. Instead of being guilty of such an error, let us glorify God, and secure our peace, by believing ourselves to be under the protection of a merciful Father, contrary to whose will not even a hair can fall from our heads.

AUGUST IV.

Sleep.

WE fall asleep more or less quickly according to the constitution and state of health. But, be it quick or slow, it is certain it comes always in the same manner, and the circumstances which precede it are the same in all men. The first thing which happens when we are falling asleep, is a stupefaction of the senses, which, no longer receiving exterior impressions, slacken and gradually become inactive. From thence the attention fails and is lost; the memory is confused; the passions are calm; the train of thought and reasoning becomes irregular. When we perceive sleep coming, it is but the first step, it is not yet sleep. It is but dozing. When quite asleep, we have no longer that consciousness, that fixed idea of ourselves, which requires memory. To the stupefaction of the senses is soon added a stiffness of the muscles. This is the second degree towards

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sleep. This state produces several symptoms in the machine, which may be observed in those who sleep in a chair. The eyes wink, open, and shut of themselves; the eye-lids fall down; the head totters, and falls forward: we endeavour to support it, but it falls still lower down, and we have no longer strength to raise it up. The chin rests on the bosom, and we sleep quietly in this attitude. If our sleep is sound, all voluntary or animal functions are suspended, but the natural or vital functions are performed with the more force. This is the third change which sleep occasions in us. Digestion is better carried on while we sleep. When awake, the natural motions are sometimes interrupted by the voluntary, and the fluids are quickened in some vessels and retarded in others. The blood is wasted in external actions, and consequently does not flow through the internal parts so abundantly. The circulation of our blood is very strong in those parts of our bodies which are in motion; and it is continually pressing the humours in the secretory vessels; whilst, on the contrary, it is so weak in the others, that the chyle can scarcely turn into blood. A sweet sleep restores the balance every where. The vessels are equally open; the juices flow uniformly; the warmth is preserved in the same degree. In a word, nothing is lost, and all contributes to the good of the machine. From these circumstances it is, that, after a sound sleep, we are rested, refreshed, active, and strong. Will not these reflections make us sensible of God's goodness towards us? What preparation, what tender care, to procure us the blessings of sleep! It particularly deserves our grateful attention, that sleep is attended with an entire heaviness of the senses, and seizes us unawares, without being able to avoid it. The first of these circumstances makes it more sound and refreshing: the second makes it an inevitable necessity. And what admirable wisdom of Provi

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dence in the regulation of the muscles during sleep! The first which grows stiff is intended to guard one of our most precious organs, and that which is most exposed to danger, the eye. As soon as we grow sleepy, the eye-lid closes of itself, covers and protects the eye till we awaken. In other parts of the body the muscles contract with more force, because their being relaxed might be dangerous and inconvenient. Let, then, the hours in which we are disposed to enjoy the sweets of sleep, be ever a time of gratitude towards our heavenly Father. Let us bless him, not only for the days happily succeeding one another, but for having so formed us, that sleep refreshes and strengthens us. Let us fall asleep with these thoughts, and let them be the first that come into our minds when we awake.

AUGUST V.

Divisibility of Bodies.

WE may easily be convinced of the infinite divisibility of bodies, by the perfumes which the plants and flowers exhale. How inconceivably small must the fragrant corpuscles of a carnation be, which spreads over a whole garden! If this is not a sufficient instance, let us consider other objects in nature; let us cast our eyes on a silk thread, the work of a poor worm. Let this thread be 360 feet long, and yet it will weigh no more than a grain, that is to say, the seventy-second part of a drachm. Let us next consider, into how many parts a length of 360 feet may be divided, even so as to have each part perceptible. An inch may be divided into 600 equal parts, each of which is the thickness of a child's hair, and consequently visible to the naked eye. Of course, a single grain of silk contains at least 2,592,000 parts, each

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of which is visible without a microscope. And as those same parts may still be divided into several more millions of other parts, a division which may be continued always farther by thought, it is evident that this progression may extend to infinity. The last particles, which cannot be separated by human industry, might still, however, have extent, and consequently, are capable of division, although it cannot be done in this world.

If we examine the animal creation, we shall discover fresh proofs of the infinite divisibility of matter. A great naturalist put pepper into a glass of water, and, by means of a microscope, he discovered in that water a multitude of animalculæ, which were a thousand million of times smaller than a grain of sand. How inconceivably small, then, must be the feet, the organs of sense, the muscles, the veins, and nerves of such animalculæ? What must their eggs be, their young, the limbs of the young ones, their vessels, and the juices which circulate in them. Here our imagination is lost, our ideas are confounded; and yet nothing is more certain than what is said here. It is particularly worth observation, that the more we magnify, by the assistance, of glasses, the works of nature, the more regular and beautiful they appear; while it is quite different in respect to those of art: For when they are examined through a microscope, we are astonished to find them so coarse, so rough and uneven, although they have been done with all imaginable care, by the best workmen. Thus God has impressed, even on the smallest atom, an image of his infinity. The most subtile body is as a world, in which millions of parts are met together, and arranged in the most perfect order. What astonishing wisdom is that which, in the little as well as the great, can operate with so much regularity and perfection! How great that power which

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AUG. VI.

Outward Construction of the Limbs of Insects.

WE judge, in general, no animals worth our attention, but those that are distinguished by their size. The horse, the elephant, the bull, and such creatures, appear to us worth looking at, while we disdain to cast our eyes on the innumerable swarm of little animals which people the air, the vegetables, and the dust. How many insects do we tread under our feet! How many caterpillars we destroy! How many flies buzz around us, without in the least exciting our curiosity! Nothing is more unreasonable than such inattention; for it is certain that the wisdom and power of our Creator is no less manifest in the construction of a worm, a snail, &c. than in that of an elephant, a horse, or a lion. The body of most insects is composed of several rings, which link one within another, and have a part in all the motions of the animal. The essential character which distinguishes insects is, that, properly, speaking, they have no bones. Even in this circumstance of their formation, much wisdom is shewn. The motions adapted to insects, the manner in which they are obliged to seek food, and particularly the many transformations they go through, could not be so easily performed, if, instead of these moveable rings which go to and fro, their bodies were connected and fastened by bones. It is observable in several insects, that they have the power to contract or enlarge their head, to lengthen or to shorten it, to conceal or to shew it, just as they please, and as their different situations require. The mouth of insects is generally provided with a sort of teeth or a trunk. This is necessary, both on account of their food,

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and the different pursuits they are exposed to. Many insects are blind, but they are made amends by the touch, or some other sense. Insects have two sorts of eyes. Those which are smooth and bright, are in small numbers; but the net-work eyes, like shagreen, and the cornea of which is cut faucet-ways, are very numerous. There are sometimes thousands of them. Neither of these are moveable, but their number and position supply that defect. The horns which most insects are furnished with are of great use to them.—These sorts of horns, by going before the body, and feeling out their way, not only warn the animal of the dangers with which it is threatened, but are a means to discover their proper food.—The legs of insects are either scaly or membraneous. The former move by means of many joints; and the latter, which are more simple, move every way. Sometimes the same animal has both these sort of legs. There are insects which have several hundred feet, without going faster than those who have but four. In regard to this part of the body there is infinite variety among insects. With what art must the limbs of those be constructed which fasten on smooth and polished surfaces! How elastic must the legs of those be which leap! How strong must those be of the insects which dig in the ground!—Two or four wings are placed in the middle of the body. Some are as transparent as a thin gauze, others are scaly and mealy:—Some are without covering, others are concealed in cases. At the sides, or the extremity of the body, there are orifices in the form of sloes, that are called prints. They are the organs of respiration. The variety observable in the construction and form of the limbs of insects is prodigious; and the lives of many men would not be long enough to observe and describe the different forms of these little animals. How varied are those of insects which walk, fly, leap, or crawl! And yet, however

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different their form may be, they are always in the same harmony and perfect proportion. Would it not be the height of extravagance and perverseness, not to acknowledge, in all this, the infinite wisdom of the Creator? We are only rational and virtuous, in proportion as we acknowledge God, and adore him in all things. Let us acquit ourselves of these duties. If we see but an insect, let us study as much as possible its wonderful construction, in order to be more sensible of the greatness of God.

AUGUST VII.

Comparison between the Senses of Men and Animals.

ARE there any animals whose senses are more perfect than those of man? It is only in particular cases that this question can be answered in the affirmative: for it may be said of man, that, in this respect also, he is in general more favoured than the brute creation. It is indeed asserted, that spiders have a finer feeling, the vulture, the bee, and the dog, a much keener smell: It is known that, by means of this sense, the hound follows the track of the game; and that other dogs are taught to find truffle under ground. The hog also digs it up with his snout, guided by the smell. The stags are supposed to have so quick a hearing, as to perceive the sound of bells several miles off; and the mole hears better under ground than man, who inhabits the surface, and lives in open air. In regard to sight, the eagle and the lynx have greatly the advantage of man. These remarks are certainly true; but if we come to consider animals on the whole, and compare them to man, we are struck with one great privilege given to

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mankind over a great number of the brute creation. Man is naturally endowed with five senses; and this advantage is not given to half the animals. The zoophites, which form the link between the animal and the vegetable kingdom, have only the sense of feeling. Many have but two senses; others have three; and those which have five are reckoned amongst the most perfect. But even the most perfect of them have not always senses more exquisite than ours. Indians can judge by their smell how much alloy is mixed in precious metals, as well as we can by applying the touchstone, to it; others, we are told, can discover at a great distance the retreats of wild beasts. The inhabitants of the Antilla islands can distinguish, by the smell, whether a Frenchman or a Black has passed by. The savages are in some measure compensated for the weakness of their intellectual faculties by the quickness of their senses. Many people have exercised and improved certain senses to an astonishing degree; and if mankind were like the animals, without other assistance besides their senses to procure food, and to guard them against dangers, if reason were not their surer and better guide, their senses, without doubt, would have acquired the highest degree of perfection, by exercising them to advantage. But, in reality, man does not require senses more exquisite than he possesses: reason compensates an hundred fold for some privileges which certain animals appear to have over him. We may even be assured, that if our senses were more keen, it would be very inconvenient to us. Let us, for example, consider hearing. If we had this sense as quick as the safety of animals requires theirs to be, even the most distant noise, and the stunning din of mixed sounds, would continually interrupt our meditations, our repose, and our noblest employments.

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Thanks to the infinite wisdom of the Creator, who has so measured the quickness of our senses, that it is enough to enjoy fully the blessings of nature, without disturbing the noblest occupations of human reason. Our senses being limited, is an advantage rather than a loss to us, a perfection rather than an imperfection. Happy the man who allows his reason to govern his senses, and who enjoys all the advantages which must result from a perfect harmony between both.

AUGUST VIII.

Thunder.

THE thunder roars, O mortal man! Who is it that causes this terrible noise? Who darts the lightning from the clouds? Behold, O sinner; it is the Ruler of the world, it is the hand of the Most High which hurls the thunder-bolt. Nature rests in his hands, he preserves and blesses it: but at his almighty word the heavens and the earth are consumed in flames. The thunder roars! How dreadful is the stormy sky! The lightning flashes! The thunder-bolt is shot! O God! how great art Thou, and how terrible is thy power! The Lord, from his throne on high, darts angry looks upon us; and by the light of his lightning we see the grave open under our feet. When the Lord sits in the clouds, men and heroes tremble. When he sharpens his anger against us, the universe turns pale. God directs the thunder: the sinner hears and shudders. Scarce does he dare to raise his eyes towards Him whose voice seems to threaten him. Christian, let not the majesty of thy God affright thy soul, when he sits in the stormy clouds, and darts his lightning. When the mighty sound of thunder terrifies the wicked man, thy God watches over thee, and

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guards thee from all danger. And though he should deprive thee of life, all his judgments are just: he is thy master, and thou wilt say unto him, Lord! my soul is at peace; whether I live or die, all my hope is in Thee. He who, when the sky is serene, glorifies his God in songs of joy and gratitude, is calm and easy when the sinner flies at the sight of the dark clouds. But where can the sinner fly? Can he escape from the Most High? In vain he would hide himself: the lightning pursues him, and reaches even to the darkest recess. Fly not then, O sinner; think not that thou canst hide thyself from the sight of the Creator, who follows thee every where, and can every moment seize thee.—When the thunder roars, thou tremblest, and strikest thy breast; when the storm ceases, thou again runnest after false pleasures. Sinner, if thou wouldst obtain mercy, bless the Lord for his goodness toward thee. Forget not the vows thou madest in thy anguish and fright: consider that God is not to be mocked. God is merciful, and spareth the rebellious, but he does not spare for ever.—The Lord is just, and the Supreme Judge will call the sinner to account. What is the thunder roaring over our heads, in comparison of that solemn day, when we shall hear the sound of a storm, in which the elements themselves will be dissolved?

AUGUST IX.

Contemplation of a Meadow.

DARK and majestic woods, where the fir-tree raises its stately head, where the tufted oaks spread their shade; ye rivers which roll your silver waves through the grey mountains, it is not you I now mean to praise: it is the verdure and enamel of the fields which are now the objects of

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my contemplation. How many beauties present themselves to the sight, and how varied are they! Millions of vegetables, millions of live creatures! Some flying from flower to flower, while others creep and crawl in the dark labyrinths of the tufted grass. All these insects, so infinitely varied in form and beauty, find food and happiness here. All inhabit this earth as we do: and however contemptible they may be in our eyes, they are all perfect in their kind.—How soft the murmur of the limpid stream, whose banks are covered with thick grass, intermixed with flowers, which, bending over the water, trace their image in it. Behold that forest of waving herbs! What a mild lustre the sun casts on those different shades of green. Those delicate plants, interwoven with the grass, thus mix their tender foliage, or else proudly raise their head above their companions, and display flowers without perfume; whilst the humble violet grows on barren hills, exhaling its sweets around. Thus one often sees the useful virtuous man in poverty, whilst the rich and great are clothed in sumptuous habits, wasting in idleness the blessings of the earth. Winged insects pursue each other in the grass. Sometimes I lose sight of them in the verdure, and then again I see a swarm of them flying in the air, and sporting in the rays of the sun. What is that gaudy flower waving near the brook? How lively its colours! How beautiful! I draw near it, and laugh at my mistake: a butterfly flies off, and leaves the blade of grass which bent under its weight. In another place I perceive an insect clothed in a black cuirass, and adorned with bright wings. It comes buzzing to rest upon a blue-bell, perhaps by the side of its companion. What other buzzing is this I hear? Why do those flowers so bend their heads? It is a swarm of young bees. They have lightly flown from their distant home, and dispersed over the gardens and fields. They are now

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gathering sweet nectar from the flowers, in order to carry it to their cells. There is not an idle one amongst them. They fly from flower to flower; and, in seeking their stores, they conceal their velvet heads in the cup of the flower, or else with labour penetrate into those that are not yet unfolded, and which afterwards incloses the bee. There, on that high clover, is perched a butterfly. He shakes his gaudy wings, he settles the shining feathers which adorn his head, and seems proud of his charms. Beautiful butterfly! make the flower bend which serves thee for a throne, and contemplate thy rich dress in the mirror of the water.—Then wilt thou resemble a young beauty, admiring herself in the glass which reflects her charms. Her clothes are less beautiful than thy wings, and her thoughts are as light as thee. Behold this little worm playing on the grass! No researches of luxury, no human art could imitate the green and gold which cover its wings, wherein all the colours of the rainbow are mixed. O how beautiful is nature! The grass and flowers grow luxurious; the trees are covered with foliage; the gentle zephyr salutes us; the flocks seek their pasture; the tender bleating lambs skip and rejoice in their existence; millions of points of grass rise up in this field, and to each point hangs a drop of dew. How many primroses with their trembling leaves are here! What harmony in the notes of the nightingale from yonder hill! Every thing expresses joy. Every thing inspires it. It reigns in the hills and dales, in woods and in groves.—O how beautiful is nature! Yes: Nature is beautiful even in the least of its productions! and whoever can be insensible to its charms becomes a prey to tumultuous desires, pursues false blessings, and deprives himself of the purest pleasures.—Happy he whose innocent life passes away in the enjoyment of the beauties of nature! The whole creation smiles upon him, and joy attends him

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wherever he goes, and under whatever shade he reposes. Pleasure springs out of every source, exhales from each flower, and resounds in every grove. Happy he who takes pleasure in innocent delights: his mind is serene as a calm summer-day. His affections are gentle and pure as the perfume of the flowers around him. Happy he, who, in the beauties of nature, traces the Creator, and devotes himself wholly to him!

AUGUST X.

Mischief occasioned by Animals.

IT is grievous to see so many productions of nature, and often some of the most beautiful of them, liable to be destroyed by animals. Summer can never pass over without perceiving (particularly among the vegetables) what mischief is done by the voracity of different sorts of birds, insects, &c. How many trees are destroyed, and fruits consumed, by worms and caterpillars! How many things necessary for our subsistence are we not deprived of by the insatiable sparrow, and the no less ravenous raven! How sad it is to see a field destroyed by rats and locusts! These and such like complaints are often made; and people fancy that certain animals exist only to torment mankind. There is some foundation for these complaints, and it cannot be denied that insects cause much mischief. It is easier to exterminate wolves, lions, and other wild beasts, than to extirpate insects, when they swarm over a whole country. At Peru, a sort of ant, called *chako*, is a real plague to the inhabitants. Their lives would even be in danger, if they did not use precautions to deliver themselves from these dreadful insects. It is well known what caterpillars do to fruit trees, and mice to the fields. But however real these

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inconveniences may be, they do not authorise such bitter complaints as we allow ourselves to make; complaints in which self-love has too great a part. We are pleased at observing, that the creatures hurtful to us destroy one another. We think we have a right to take away the lives of animals, either for our food, or for any other purpose; but cannot bear that they should take any thing from us. We expect that they should serve for our subsistence, and will give up nothing to them. In reality, however, have we more right over the life of a gnat, than it has to a drop of our blood? Besides, in complaining of the voracity of animals, we do not consider that this plan of nature is not so disadvantageous as it appears. In order to be convinced of this, we have only to consider the animal kingdom in the whole. Such a species, which appears noxious, is, however, of real use; and it would be very dangerous to attempt to destroy the race of them. A few years ago, some inhabitants of the English colonies in America, endeavoured to extirpate the jays, or jackdaws, because they fancied that these birds did much mischief to the corn; but in proportion as the number of jays diminished, the people were struck with the havoc made by an enormous multitude of worms, caterpillars, and particularly the May-bugs. They soon ceased to persecute the jays; and, as soon as those multiplied again, they put an end to this plague, which had been the consequence of their destruction. Some time ago a project was formed in Sweden to destroy the crows; but they were observed in time not only to fix on corn and plants, but also that they devoured the worms and caterpillars, which destroy the leaves or roots of vegetables. In North America they pursued the sparrow violently; but it happened from thence that the gnats increased to such a degree in the marshy countries, that they were obliged to leave a great deal of land

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uncultivated. Pheasant-hunting is so considerable in the isle of Porcido, that it occasioned the king of Naples to forbid the use of cats to the inhabitants. At the end of a few years the rats and mice increased so much, and did such mischief, that this order was abolished. And why should we be so selfish as to envy creatures the small part of our provisions, which they require for food? Could we possibly consume all that nature produces? Shall we want any thing for our support or pleasure, because the birds, the mice, and the insects, help us to make use of the blessings which God grants in such profusion, and part of which would be wasted, were not the animals to feed on it. Instead of giving way to unjust complaints, let us rather in this acknowledge the wisdom of our Creator. Every thing in nature is connected together. No creature is useless, or placed without design, although the use of many animals is unknown to us. It is enough that they exist; we may be certain that it is for the wisest purposes. Thus the seeing the apparent destruction and disorders in nature ought to make us look up to a God, who has created nothing in vain; who preserves nothing without a reason; and who, if he permits any thing to be destroyed, does it not without a wise design. If we are thoroughly convinced of these truths, all the works of God will lead us to glorify and bless him.

AUGUST XI.

Variety of Colours.

WHEN we consider how dull and melancholy the country would be, and how confused all objects would appear, if they were of one colour only, we must acknowledge the wisdom and goodness of God, who, by variety of shades and

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colours, meant to increase and vary our pleasures on earth. If he had not designed to place us in an agreeable situation, why should every place around us be adorned with such a variety of beautiful painting? The sky, and all the objects seen at a distance, are painted in the greatest style. Splendour and magnificence are their characteristics. Lightness, delicacy, and the minute graces, appear in the objects designed to be seen near, such as foliage, birds, flowers, &c.

But from whence proceeds the distinction of colours? Each ray of light appears to be simple; but, by refraction, it divides into several; and it is from hence that colours arise. A glass of water laid in the sun reflects certain colours on white paper. Angular glass well cut and polished, casts still more lively colours. But we should see the finest rainbow close to us if we turn a prism towards the sun, or if, with the prism (or triangular glass), we receive a ray, entering by a little hole into a close shut room.—The colours are in proportion more or less bright, according as the refraction of rays is more or less strong. The most refrangible ray is the violet, and consequently it is the weakest. Afterwards come lower the indigo, blue, green, yellow, orange, and the red, which of all the rays is least refrangible. The nature also of the coloured bodies contributes to the variety of colours. The smallest parts in almost all bodies are transparent. This is the cause of their breaking, absorbing, or reflecting rays, sometimes one way, and sometimes another, as the angular glasses do. What shews besides, that colours are not inherent in coloured bodies, is, that the neck and feathers of a pigeon or peacock, and even the stuffs called changeable taffeties, silk, &c. all change colour according to their position. This may make us comprehend from whence proceeds the variety of colours. The whole is comprised in this, that the surface of bo-

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bodies is composed of extreme small flakes, which, according to their different thicknesses, reflect some coloured rays, while they admit or absorb others in their pores. Thus, when a body, whose surface is smooth, reflects and throws out almost all the rays of light, it appears *white;* and when, on the contrary, it absorbs them, it is *black.* Let us in this admire the wisdom and goodness of God. If the rays did not divide, and were not differently coloured, every thing would be alike, and we could only distinguish objects by reasoning, and by circumstances of time and place. How tedious and perplexed would it be, if we were every instant to distinguish one thing from another by reasoning. Our whole lives would be taken up in studying rather than in acting, and we should be for ever in a state of uncertainty. If there was but one colour in the world, our eyes would soon be tired, and this dull uniformity would give us more disgust than pleasure. The different colours God has ordained, serve to spread more beauty on the earth, and to afford pleasures ever new to the eye. It is still another proof, that God, in the formation of the world, not only considered the essential perfection of his works, but adorned them also with every thing which would enhance their value. In the mixture, and the several shades of colours, the useful and the beautiful are ever united. As far as our sight can reach, we always discover new charms in the fields, the valleys, and the hills. All contribute to give us pleasure, and all ought to excite our gratitude.

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AUGUST XII.

The Buildings of the Beavers.

IF a man, who had never heard of the beavers' manner of building, had been shewn some of their edifices, he would certainly have supposed them the work of skilful architects. The whole performance of these amphibious creatures is wonderful. The regularity of the plan, the size, the solidity, and the admirable contrivance of their buildings, must fill every attentive observer with astonishment. The beavers choose a place to build on where they can have plenty of provisions, and near a rivulet, in order to have a reservoir of water to bathe in. They begin by making a dike or bank which keeps the water on a level with the first floor of their house.—— The bank is sometimes a prodigious work. It is about ten or twelve feet thick at bottom. It goes sloping, and insensibly diminishing towards the top, till it becomes no more than two feet. The only materials for this dike are wood and clay. The beavers cut pieces of wood as thick as an arm, with wonderful ease. They fix these upright down into the ground, very close to each other, and interweave between smaller and more supple pieces of wood. But as the water would get through, and their watering-place would be empty, they have recourse to clay or potter's earth, which they know where to find, and with which they fill all the spaces within and without, so that the water cannot run through. In proportion as the water rises, they continue to raise the dike. The bank of the watering-place being finished, they labour at their houses, which are round or oval buildings, divided into three stories, raised one above another: one of them is below

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the dike, and generally full of water; the other two are above it. They fix these little buildings in a very strong and firm manner on the edge of their watering-place, and always by stories, in order to mount higher, in case the water should rise. If they find a little island near the watering-place, they build their house upon it, which is then more solid, and they are less incommoded by water, in which they cannot long remain. If they do not find this convenience, they, with the help of their teeth, put piles or stakes into the ground, in order to support the building, and preserve it from the wind and water. They make two doors at the bottom to go out into the water. One leads them to their bathing-place; the other is a passage to the place where they carry all the dirt, &c. from their upper apartments. They have a third door, higher up, for fear of being taken when the ice stops up the lower doors. They sometimes build their houses entirely on dry ground, and make ditches five or six feet deep, to get to the water. They use the same industry, and the same materials, for the buildings as for the dikes. The walls are perpendicular, and two feet thick. They cut off with their teeth the ends of wood which go beyond the level of the wall, then, mixing clay with dry herbs, they make a composition of it, with which they plaster both inside and outside of the work, by the help of their tail. The inside of the house is arched; and the size is in proportion to the number of inhabitants. Twelve feet long, by eight or ten feet wide, serves for eight or ten beavers. If the number is greater, they enlarge the building in proportion. The instruments the beavers employ are four strong and sharp teeth; two fore feet, the claws of which are divided; two hind feet, with membranes, or webbed; and a tail covered with scales, formed like an oblong trowel. With these few utensils,

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they shame our masons and carpenters, provided as they are with trowels, squares, and hatchets. With their teeth they cut all the wood they require for building; they make use of their fore feet to dig the ground, and to soften and mix the clay; their tail supplies the place of a wheel-barrow to carry their mortar or clay, and afterwards serves as a trowel to plaster it on.

The works of the beaver have, then, the greatest resemblance to those of man; and if we were to judge by the first impression they make upon us, we should think them rational, and acting from reflection. But if they were capable of reflecting, they would build differently now from what they did formerly; they would continually improve: but they have always followed the same method, and have never gone out of the line Nature prescribed them. Thus, the beavers now build exactly the same houses they built before the deluge. But this does not render them unworthy of our attention and admiration, as of all animals we know they come the nearest to human reason. We need only observe them, to be convinced that beasts are not mere machines, but that all their actions and motions are directed by a higher principle. Yet, what infinite difference has the Creator placed between them in their faculties? How much superior is the instinct of the beaver to that of the sheep! and what divine wisdom is shewn in these degrees, by which the brute creation insensibly draws near to man! May we profit by the discoveries made of the different faculties of animals, and may we make use of them, by more and more improving our knowledge and love of the Creator of all beings.

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AUGUST XIII.

Animals considered as Examples to Mankind of Vices and Virtues.

THE study of animated nature furnishes us with many pleasing ideas, especially as it gives us every where proofs of the divine wisdom and goodness; but I do not know whether we attend as much as we ought to the lessons of morality it seems intended to convey. Had man continued in a state of innocence, he must still, I should suppose, have been capable of improvement. Life would have been to him a state not only of trial, but of instruction; and it is natural to believe that the animals, which it pleased his Creator to bring before him (that, seeing their different dispositions, he might learn to call them by suitable names), were intended to be his instructors, as to the difference between good and evil, which in himself he would not have experienced, if he had never sinned. If, from the apparent sufferings of some animals, and the seeming cruelty, tyranny, and oppression, exercised by others, and from the various exertions of the tender as well as of the violent passions, which we may observe in the brute creation, man was to learn to hate the one, and love the other, a reason why things are so (at least with regard to ourselves) must be allowed. It is remarkable that compassion belongs to man alone. It is spoken of God in a metaphorical sense; for we cannot suppose the Deity to suffer with his creatures, as we do for each other. In God is mercy, mercy free and infinite; in man, compassion for all created beings. In the brute creation some few instances of affection are found; no compassion properly so called; no free disinterested pity. Some virtues;

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the brute creatures, especially the domestic animals, may teach us; and doubtless they were intended to do so. The innocent lamb, in a language more powerful than words, instructs us to practise the gentle meek arts of persuasion. The obedient ox and cow inculcate mild submission. The ass is an example of patience; the generous horse of activity and aptness to receive instruction. The goat teaches us to value liberty. The dog is an example of fidelity and kind attention; the cat of various domestic virtues.—Friendship seems unknown, or but faintly expressed, amongst animals, excepting dogs and horses; and in them it is chiefly towards man. Nor is conjugal affection observable, except in the feathered race; among whom the common dunghill cock is distinguished by his preference of his wives to himself in the circumstance of food; also the singing birds in their attendance on the hen, whose cares the cock shares, or at least endeavours to alleviate. But the shining quality in animals is parental affection, at least in the female sex. The vices which the dumb animals teach us to avoid are much greater, and more in number, than their virtue. The gluttony, sloth, and filth of the hog, we detest. The dog, when fawning on his oppressor, is an object of contempt. The camel, though useful, seems framed for slavery. The pride and ill-nature of the peacock we dislike as much as his voice. The turkey is a pattern of all the vices in man; and is an exception, as well as the hog, to the moral character of the domestic beasts and birds. The elephant is in many things admirable; but his base concurrence towards enslaving his fellows, his submitting to be the executioner of tyranny in destroying criminals, and his mad rage, on many occasions, cancel all his pretensions to reason.

Though what is here mentioned may be styled common-place, yet, so long as mankind are inat-

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tentive, such things may properly be pointed out, and much more might be said. The beaver, if contrasted with that horrible creature called the glutton, the bee with the wasp, the ant with the flesh-fly, would teach us, as well as the domestic animals, to do good, and avoid evil. But the subject is almost inexhaustible. I will therefore conclude with a part of the creation more numerous perhaps than all the rest put together; I mean the fish, both those with scales, and those which have shells, but all the oviparous kind; for the viviparous are like the quadrupeds as to their moral endowments. They seem to travel in vast bodies, not from any love of society, but merely because they are born in the same or in neighbouring situations, and live on the same food, which they find near the coasts where they themselves are to feed us. They are driven in by the large fish which prey upon them, but which they seem neither to fear nor to hate. Conjugal and parental love do not exist among them, any more than friendship or compassion. Vanity, pride, envy, or hatred, they are strangers to. If any passion, beyond an appetite for food, exists among these, or the various kinds of shell-fish, it can only be conjectured from the circumstance of lobsters sometimes wanting a claw, from which we suppose they fight; but it may not be so. Fish want no assistance from man; nor do they by their actions call for it; nor have they any sound, as far as we know, whereby to express sorrow or joy. Appetite for food will tame a carp; and it once produced a learned fish: but these are the only proofs of any capacity for improvement. Perhaps the lively motions of the small fry, and of the golden fish, which give us an idea of joy, are merely owing to their eagerness for prey. Fish then seem to be absolutely void of reason. Removed from the sight of man, they can only instruct the attentive inquisitive mind. Such they

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may teach to despise a state of mute insensibility, and to be thankful for the pleasing sensations man enjoys from a due exertion of his passions, and for that religion which teaches him to know how to govern them. It may also check the pride of man, to reflect, that so large a portion of animated nature as that which the waters contain, is made wholly independent of him as to food and enjoyment; and that, when degenerated into a savage state, he is himself reduced to seek a maintenance from them: the last resource of a kind Providence to supply the want and misery which sloth and inattention have brought upon the human race.

AUGUST XIV.

Nature seen and considered in different points of view.

THE works of nature, so superior in every way to those of art, are particularly distinguished by that admirable variety which continually affords us new sources of pleasure and surprise. We look once or twice at a work of art; and if we do return to it again, we at last grow tired, and see it with perfect indifference. But when we attentively examine and reflect on the works of nature, we are never tired of them. They fill our minds ever with new delight; and we are lost in contemplation. Let us first consider nature in its most sublime point of view. With what astonishment shall we not be struck, in beholding the immensity of the heavens, the inconceivable number of stars, and the vast extent of the sea. Compared to these, how small and trifling must appear all works of art, however great and excellent they may be! All that God creates, or does, is stamped with a greatness which surpasses all our ideas and con-

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ception. To give us an idea of his infinity, he had only to form the starry sky. This displays the magnificent greatness of the Creator, more than all that the earth contains. Is there any thing so adapted to inspire us with the profoundest veneration for God, as the contemplation of these great works! With what awe, what religious dread, ought we not to be inspired on beholding these great phenomena of nature which no mortal could produce, earthquakes, volcanos, inundations, storms, and tempests! These great scenes of nature are sometimes before us; and there are none of them which ought not to make us feel the majesty and greatness of the Creator of heaven and earth. Nature also presents itself in the pleasing point of view. We behold valleys adorned with verdure and beautiful flowers, fields promising rich harvests, hills covered with trees, vines, all sorts of simples and salutary plants.—In all those cheerful scenes, God appears as the friend and benefactor of mankind, who openeth his hand and filleth all things living with plenteousness. This is the season in which all nature furnishes striking proofs of it. Every thing combines to please and flatter our senses, to support and rejoice us. But the time will soon come, when nature will appear under a sad and gloomy form. It will lose much of its beauty and variety. It will resemble a desert which promises neither riches nor pleasure. Each day draws us nearer to that gloomy season; and the insensible decrease of the days already warn us that we must soon confine ourselves to our apartments. But nature ought still to please us even under this form; for the winter also has its share in the perfection of the world; and without it we should lose the pleasures of spring and summer. Let us apply all these reflections to our own lives: they are equally liable to variation; they change form continually. To the finest and most cheerful scenes

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there often succeed the most dull and melancholy. Let us, therefore, when in prosperity, prepare ourselves for adversity; and let us bless God in every situation of life.

AUGUST XV.

Mischiefs which Rains may Occasion.

MODERATE rain always contributes to the fertility and growth of plants; consequently it is an inestimable blessing to the earth. But in many respects rain may become hurtful to vegetables, when it falls too heavily, or lasts too long. When it is too violent, it beats delicate plants into the ground; and if it continues too long it prevents their growth. An excessive wet deprives them of the necessary heat; the circulation of the sap is interrupted; the secretions do not operate properly; the plants languish, and are in danger of perishing. But though these are the most common ways in which rain becomes hurtful, they are not the worst. It sometimes makes sad havoc, when several clouds, drove by impetuous winds, meet towers, mountains, and other high places in their way; they burst, and all at once discharge the water with which they were filled. This is called cloud-cataracts. This must necessarily do great mischief; for water not being compressible, must, when pressed down, burst suddenly, and flow with great violence from mountains or great heights. It is not wonderful it should then sweep away large stones, tear up trees, and throw down buildings; for two causes combine to render its effects more violent: on the one hand, its quantity, and on the other, its swiftness, increased by the height from which it falls; the action of a body which moves being always in proportion to its mass and its velocity.

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The water-spouts are still more formidable; they are shaped like a pillar, or cone, with the point towards the ground, and the base joining to a cloud. These water-spouts attract and draw up every thing they meet in their way; which is dashed down again with the water most violently. If the point of the pyramid touches the sea, the water boils up, foams, and rises with a terrible noise; but, if it falls on ships or buildings, it shatters and throws the latter down, and very often sinks the others. In all probability, this meteor is occasioned by the wind blowing different ways, and meeting several clouds, which they drive violently against each other. When these different winds strike the clouds on the side, they of course occasion their turning round rapidly; and, in this circular motion, they take the form of a whirlwind; and their weight being suddenly increased by the force of pressure, they fall down impetuously; and, in their fall, they take the form of a column; sometimes conic, sometimes cylindrical, turning rapidly round about. Their violence is in proportion to the quantity of water which falls altogether, and to the velocity of its fall. Cataracts and water-spouts are always dangerous. Happily the latter are very rare on land; but they are more frequent at sea. As to the cloud cataracts, the mountainous countries are more exposed to them than the flat countries; and they happen so seldom, that many years pass without an acre of ground being destroyed by them. However this may be, it is wrong to murmur when these disasters happen. Many people are greatly affected by these events; they look upon them as most fatal, and their imagination multiplies and magnifies objects. When a little corner of the earth (which, in comparison of our globe, is a mere speck) happens to be laid waste by a water-spout, or by any such accident,

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its young, or leaves them to chance. Their self-love, on the contrary, extends to their posterity, and that with the greatest solicitude, and in the manner most suitable to their different species, and different kinds of life. Some of those little creatures which are hatched from the eggs of fish and insects, do not require to be sat upon, because the warmth of the air in summer is sufficient, and because they are able to assist themselves as soon as they are born, provided they are in a proper place, and are within reach of food. Fish and amphibious animals cannot distinguish their young from others of the same species, and yet nature teaches them the best means to provide for the chief wants of new generations. Fish come in shoals to deposit their eggs near the shore, where the water being lower is more warmed by the sun, and where they may be hatched more easily, and afterwards find food. The amphibious animals come out of the water, to lay their eggs in the sand, exposed to the heat of the sun, as if they knew that their young would find out of themselves their true element, and the place where they are designed to live and find their food. Gnats, and other insects which are born in the water, but live either in the earth or air, never fail to lay their eggs where their young ought to be born. The insects which fly over the earth, and which in general require no longer any food themselves, still take care to deposit their eggs in plants, fruit, flesh, and other things, which serve for food for their young. There are some which pursue other animals, in order to insinuate their eggs into their skin, their hair, their mouth, or their entrails. Some animals lay their eggs in nests, which they have prepared, and where they beforehand carry all the provision their young will require. Other animals, which are helpless at their birth, are consigned to the care of their parents. How much anxiety the birds have, even before they lay their

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eggs! With what assiduity and patience they brood over their eggs for several weeks, scarce giving themselves time to eat! What care they take to warm their young, when they are hatched, and to give them proper food! What courage they show in defending them, and securing them at the hazard of their own lives! Is it not also a very singular instinct in the quadrupeds, to cut, with their teeth, the navel-string of their young, and do it with proper precautions, that they may not lose too much blood? With what tenderness and attention they suckle them, and guard them from all danger! In general, the instinct of animals, for the preservation of their young, is stronger than the desire of satisfying their own wants. They suffer hunger and thirst; they refuse themselves sleep; they even expose their own lives, rather than neglect their little ones. In this instinct, which God has implanted in animals, what admirable wisdom appears! For the preservation of every species depends on the care which the parents take of their young. It is not wonderful that the viviparous animals should be fond of their young: It is their flesh and blood. But that the oviparous should be solicitous about their eggs, is to me absolutely inexplicable. The eggs are quite different in form from the parents, and in every respect are unlike any animal. Besides this, the birds begin to build their nests before the eggs are visible; and the insects also seek places where the new generation may find subsistence, before they lay theirs.

Adorable Creator of the world, open our minds, that we may more and more acknowledge the wisdom which shines throughout all thy works!

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AUGUST XVII.

Several sorts of extraordinary Rain.

EVERY phenomenon, however natural and useful it may be, is an object of terror and fright to the ignorant and superstitious. We see a proof of it in those rains which superstition looks upon as supernatural, and which frighten so many people. Who is it that does not tremble when he hears of *showers of blood!* Sometimes, and particularly in summer, there falls a reddish rain to which they give that name; or rather, they suppose such has fallen, when, after a common shower, the surface of the water appears red, or that some drops of that colour have fallen on the ground. The people believe it is really blood, which falls like rain. If so, it is not wonderful that it should be imputed to supernatural causes. There is nothing in it, however, but what is very natural: For the atmosphere being filled with different matter, and mixed with many foreign bodies, we must not be surprised that rain should partake of this mixture. It may easily happen that coloured particles should fall with the rain. The wind may raise and scatter about the coloured meal of the flowers, and even the real excrement of certain butterflies. There are also little red insects on the surface of the water, which credulous people may take for blood. Sometimes a certain slimy humour, produced by fat reddish particles which mix in the air, falls with the rain, as it happened in 1764, in Westphalia, and other places. But this is so far from being wonderful, that it would, on the contrary, be extraordinary if these phenomena did not now and then happen. It is the same in respect to the showers of *brimstone* which are said

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to fall frequently. This rain is not brimstone, properly speaking, although it is possible that the atmosphere, being full of sulphureous particles, some of them may mix with the rain. But it has been found, from many observations, that these rains are only flowers, or coloured seeds of plants, or small sand and yellowish dust, which the wind raises and brings from different countries, that mix with the rain. The supposed showers of *wheat* are formed in the same way. When heavy rain falls in places where there grows much small celandine, it uncovers their roots, which are very slender. The little scallions which adhere to them, loosen and scatter about, and are supposed to be wheat fallen from the clouds, which superstitious people believe to be a sign of scarcity and famine. But from whence come all those caterpillars with which the gardens and fields are sometimes strewed after rain has fallen? Nothing more natural than this. The atmosphere containing numberless different sorts of matter, it is very probable that insects, with their eggs, should mix in it. The latter only require a place to hatch in; consequently, when they fall with the rain, they stick to the leaves, and there come to life. The possibility of this is proved by the following fact, related by respectable writers: The rains which fall in Philadelphia, during the month of August, bring with them insects, which when they stick to men's skins, and are not immediately taken off, bite and cause violent itching. And if these little animals happen to fall on woollen-stuff, they fix in it, and multiply like moths.

We are not sensible enough of our obligation to naturalists, for having, by their inquiries and remarks, removed so many superstitious prejudices. It must, however, be confessed, that the common people are still full of them, which shews that men in general are more inclined to

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error than to truth, and that they are not convinced, as they ought to be, of the wisdom and goodness of God's government. Let us not dishonour our reason, and God himself, by such prejudices. Let it be to us a source of consolation and joy, to be more and more convinced that every thing in nature is well ordered, and that God always proposes views infinitely wise. Let us leave to infidels and pagans their superstition; but we who have the happiness of knowing the true God, let us glorify him by faith, and shew due honour, by confiding in him; and let us labour with all our might to spread, more and more, reason, wisdom, and piety among men.

AUGUST XVIII.

Sensitive Plants.

WE observe certain motions in plants, which make it doubtful whether they have sensibility or not. There are vegetables, the flowers and leaves of which contract and shrink from the touch. We see others, which open and close their flowers at certain fixed hours of the day, so regularly as to mark the time very exactly. Others take a singular form in the night, and fold themselves up. These motions in the plants are the same, whether they are in the open air, or shut in a close room. Those which always live under water, raise their heads above it in the time of seeding. The movements of a marshy plant, discovered lately in Carolina, are still more singular: the upper side and edge of its round leaves are covered with a number of notches, which are extremely irritable. When an insect chances to creep on this upper side, the leaf folds it up close, and presses it to death; and then opens itself again. We may, every day, observe certain regular motions in

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some of the plants in our gardens. The tulips blow in fine weather, but they close again when it rains, or at sun-set. Scots vegetables, such as pease and beans, open their husks when they grow dry, and roll up like chips. Wild oats, when put on a table, often move of themselves, particularly if they have been made warm in the hand. Do we not also observe the sun-flower, and several other plants, always turned towards the sun? These are undeniable facts, which any body may easily experience. From thence it was wished to draw a conclusion, that there was some sensibility in plants; and it is true that the above-mentioned facts give some degree of probability to that opinion. But, on the other hand, there has not been any other mark of sensibility discovered in plants: every thing appears absolutely mechanical in them. We plant a shrub, and destroy it, without observing any analogy between the animal and it. We observe a plant shoot, grow, blossom, and turn to seed, as we observe the hand of a watch run over all the points of the dial. The most exact anatomy of a plant does not discover any organ the least resembling the seat of animal sensibility. When we oppose these observations to those from whence the sensibility of plants may be inferred, we remain in doubt, and know not how to explain the above-mentioned phenomena. Perhaps all we observe, in regard to the motions of plants, may only proceed from the construction of some of their fibres, which sometimes contract and sometimes expand. Perhaps the subtile exhalations of our bodies cause the sensitive plants to shrink when we touch them. But it may also possibly be, that all nature being linked, the first degree of sensation may subsist in certain plants; as indeed the step is very narrow between the plant and the muscle shell-fish. Therefore sensibility may perhaps extend even to plants, at least to those nearest animals.

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Behold how very imperfect our knowledge is on these subjects! All is mere conjecture. We can neither deny nor positively assert the sensibility of plants. Let us rest in uncertainty, and not endeavour to pass the bounds prescribed. Let us only give the glory due to our Creator, and be persuaded, that whatever may be the principle of these phenomena, the plan he has formed, in this respect, as in all the rest, must be dictated by unbounded wisdom and goodness. Though these things remain obscure and problematical, we know enough to satisfy a reasonable curiosity. Let us endeavour to apply the knowledge we have, without losing time in speculations more curious than useful; and without aiming at understanding what may perhaps be reserved for those who come after us, or even for eternity itself.

AUGUST XIX.

The Fear of Storms.

AT a season wherein nature presents to our eyes none but pleasing cheerful scenes, there are some people, notwithstanding, who still complain and murmur. Summer, they say, would indeed be delightful, if storms did not come to disturb and banish all joy from their souls. The fear of thunder and storms is chiefly owing to the opinion of their being the effects of the wrath of Heaven, and ministers of its vengeance. For if, on the contrary, we considered how much these storms contribute to purify the air from numberless noxious vapours, and to fertilize the earth; if we would take proper precautions against the terrible effects of lightning, the storms would cease to be so dreadful to us, and would rather inspire gratitude than terror. But it may be said, however, and cannot be denied, that thunder-storms often

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do great mischief. How frequently has lightning struck men and animals, and consumed whole towns and villages? Yet to this we may answer, that here, as in many other cases, terror greatly magnifies the evil and the danger. To shew how little chance there is of being struck by lightning, it is enough to know, that out of seven hundred and fifty thousand persons, who died in the space of thirty years in London, there were but two of them killed by lightning. Observe also, that, during the greatest claps of thunder, most people prolong their fear without reason. Whoever has time to fear the natural consequences of lightning is already out of danger. It is only the lightning which is fatal. When we have seen, and not been touched by it, and when the thunder does not come with it immediately, it is doubly foolish to turn pale, or tremble, at the hearing of a clap, or to stop the ears for fear of sound, which is no longer dangerous. What ought to put an end sooner to our fright, or to prevent it entirely, is, that after the flash of lightning is over, we may securely wait for the clap of thunder, as it is certainly as harmless as the sound of a cannon. The thunder tells us we have escaped the danger, and at the same time informs us at what distance it is: for the greater space of time there is between the clap of thunder and the flash of lightning, the more distant is the storm.

The surest means to guard against fear of thunder, or any other alarming phenomena of nature, is to endeavour to have a good conscience. The righteous man, calm, and composed, fears not the judgments of Heaven. He knows that at God's command all nature is armed against sinners. But even when the Supreme Judge strikes and terrifies the wicked, the good man knows that he is under the protection of the Most High. "He hears the thunder roar, but he trembles not. His Creator, the God whom he adores, commands the storm.

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He knows when it is only to terrify, and when it is to strike. He sports with the tempests and storms. He makes use of them to convince the infidel, who dares doubt it, of his existence, and to give terror to the wicked. It is not for the friends of God to tremble. It is their glory to love and put their trust in him, even when his thunder roars. A day will come, when, raised above the stormy regions, they will traverse the clouds by the light of his lightnings." They will then find that even thunder is a blessing which God makes use of in order to purify the air; and they will bless that Great Being, who, though under an appearance the most dreadful, still vouchsafes to supply the wants of the earth. In one hand he holds the thunder, with the other he watereth the ground; and thus, by turns, he shews himself a Father and a Judge.

AUGUST XX.

Summer furnishes us with Images of Death.

A FEW weeks ago our gardens afforded us chearful pleasing scenes, where every thing inspired serene delight. But now the prospect becomes daily less agreeable and less varied. Most of the flowers which adorned our gardens are gone, and a few only remain, which but recal to us the charming scene we enjoyed some months ago. These revolutions in nature are instructive lessons for us. There is a time of life, in which we have all the charms of spring; we are admired and loved, and excellent fruit is expected from us. But how often is this expectation disappointed! The blossoms drop off, even before they are blown; a fit of sickness robs us of all our charms, and a premature death puts an end to all our hopes. We observe the spring-flowers,

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which last till summer withers them, and are gone in a few hours. A striking emblem of death! There scarce passes a day, in which we do not behold men surprised with sudden death, when they least expected it; one of the many means which God makes use of to draw us to our end. It is true, that from habit, we become almost indifferent to the death of so many of our fellow-citizens as are suddenly cut off. But it is not the less true, that "the days of man are as the grass of the field. In the morning it is green, and groweth up, but in the evening it is cut down, dried up, and withered."

We are now in a season when we endeavour to avoid the heat of the sun, and seek the cool shade of the forests. But are not these retreats calculated to make us reflect on the silence and darkness of the grave? It is there that we shall find rest after the fatigue and heat of the day. The mower prepares to mow his corn. The scythe cuts down the wheat on every side, and leaves desert and empty fields behind. This reminds us of our own lot. All flesh is as grass, and the whole duration of this life, with all its glory, is but as the flower of the field. Man flourishes for a little, and is then cut down, when the great Ruler of the harvest ordains it. The very bees proclaim this truth. When we reflect on the activity and industry with which they gather and prepare their honey, we learn to lay up early treasures of wisdom and virtue, which may be a comfort to us in our old age, and in the hour of death. The farmers will soon unite in gathering the fruits of the earth, to lay them up in their barns. These days of harvest are the most important in the whole year. But, O God! how solemn will be that great day, in which the Creator himself will be the reaper! that in which all the dead shall rise from the grave, and the Supreme Judge shall say to his angels, "Gather ye together first the tares, and

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bind them in bundles to burn them; but gather the wheat into my barn!" With what joy I look for that day of harvest! "He that now goeth on his way weeping, and beareth good fruit, shall doubtless come again with joy, and bring his sheaves with him."

These are not the only emblems of death with which nature furnishes us, but they are the strongest. The man who reflects upon them, can only consider them as the pictures of the brevity and frailty of life; and there is no danger that such reflections as these should disturb that cheerfulness so natural to us in summer. Meditations on death are the best means of improving this happy season, and making it still more agreeable than it is. When once we look on death in its proper light, far from considering it as an enemy to pleasure, we acknowledge that the thought ennobles and increases our happiness. Should we run into imprudent excesses in summer-time, if the thought of death was present to us? Should we make an improper use of God's blessings, if we remembered that the hour will come wherein we must give an account of our administration? Would the goods of this life corrupt our hearts, if we considered how fleeting they are? Would the burden we bear in the heat of the day, or the miseries to which we are exposed, excite our murmurs, if we reflected that the evening would bring us comfort and rest? Should we place our first happiness in the enjoyment of the world and its pleasures, if we accustomed ourselves to think that we should one day enjoy a better world, with purer, nobler, and never-ending pleasures in it?

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AUGUST XXI.

Causes of the Heat of the Earth.

ONE of the chief causes of the heat of our globe is certainly the sun, and its position relatively to such and such parts of the earth. When the sun is in the south, the days are not so hot towards the north, as when that planet is near the northern pole. The same is observed in the southern parts of the earth, when the sun is turned towards the north. In countries where the sun is generally vertical, the cold is never so great as to freeze the rivers or lakes; on the contrary, the heat is always intense. It becomes violent when the sun is long above the horizon: and by that means darts its rays a considerable time on the same place. This is the reason, that, towards the poles, where the days are not very long, the heat is sometimes intense in certain countries. When all this is considered, we must necessarily conclude that the sun and its position with regard to the earth, is one of the chief causes of the heat in the open air. But this is not the only cause; for, if it was, all the summers would be equally cool: the temperature of the air must also be then exactly the same in all countries situated in the same climate; which is not the case. It is observed, that, on the highest mountains, where there are spacious plains at top, and upon which there are also other hills, and other plains, it is still much colder than in low lands and deep valleys. Even under the line, if, from a plain where the heat is oppressive, we go up a hill 12,000 feet high, we shall find the sharpest cold. It has also been remarked in winter, that when the cold has been severe in the day-time, it has sensibly diminished towards

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mid-night; and the weather becomes temperate, though the rays of the sun do not then warm the atmosphere. It is therefore certain that there may be a heat in the air which is not immediately produced by the sun. There are certain bodies, which, by friction or percussion, grow warm and take fire. The axle-trees of wheels take fire when the carriages go too fast, and are not properly greased. Other substances grow warm, and even inflame, when they meet together. If a certain quantity of water is poured on a bundle of hay or straw, it will occasion a considerable degree of heat. Bodies which corrupt or ferment, often acquire a heat perceptible by the thermometer, or merely by the feeling. Even in the air, the motion of certain substances may occasion mixtures, dissolutions, and combinations, which produce great heat. Thus, then, we may account for the production of heat in the open air. In the first place, the sun is the principal cause of it: to the heat proceeding from this planet is united that of many living creatures; that of fire produced by wood, coal, and other combustibles; that which comes out of the bowels of the earth, the bottom of the sea, and from mineral and warm springs. The heat is often much increased by the fermentations which different bodies undergo, whether in the surface of the earth, or in the higher atmosphere, and which occasion hot vapours. When, therefore, all sorts of little particles, such as float in the lower atmosphere, and are calculated to receive and retain heat, when they grow warm, and are carried away by the wind or rain, the heat gradually increases, and becomes more and more intense. On the contrary, it abates when any of the above-mentioned causes cease.

All these plans are worthy of the wisdom and goodness of God; they are useful to all the habitable parts of the globe; and he has granted to

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each climate that degree of happiness it was susceptible of. But we, in particular, who live under a temperate climate, more sensibly experience his paternal care. Heat and cold are dispensed to us in the wisest proportion; and we should be the most ungrateful of beings, were we not to acknowledge and praise his goodness towards us.

AUGUST XXII.

Variety of Plants.

ONE of the things most worthy of our admiration in the vegetable kingdom, is the great variety of plants. They are varied in respect to their parts, their production, their properties, and qualities. The manner in which some plants become fruitful is still very obscure. It is little known, for example, how it operates in moss, mushrooms, and fern. There are plants which shew us singular monstrosities: there are flowers which have no heads; there are some from the middle of which spring out other flowers; certain plants, called soporiferous, which turn at night differently from what they do in the day. Others turn towards the sun; others shrink and contract when we touch them. There are flowers which open and shut at certain regular hours. Some shoot up, blossom, bear fruit, and drop their leaves sooner than others. All plants are originally wild; that is, they grow without culture. The Creator assigned for plants a climate adapted to their nature and purposes, and where they should arrive at the greatest perfection. But those which are exotic may be naturalized with us, and made to succeed very well, provided care is taken to procure for them the degree of heat their nature requires. What particularly charms the eye is the variety of forms in plants. Let

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the most perfect of them be compared to those that are least so; or let even the different sorts of the same species be compared, and we cannot but admire the astonishing variety of models from which nature draws in the vegetable world. We step with wonder from the truffle to the sensitive plant, from the mushroom to the carnation, from the acorn to the lilac, from the *nostock* to the rose-tree, from moss to the cherry-tree, from the morel to the oak, from the misletoe to the orange-tree, from the ivy to the fir. If we consider the numerous sorts of mushrooms, or the kind of plants which we call imperfect, we cannot but admire the fertility of nature in the production of those vegetables, which are so different in form from the others, that we can scarce rank them among plants. If we afterwards rise some steps up the chain of plants, we behold with pleasure the degrees of those with stalks, from the grass which grows between the stones, to that inestimable plant to which we owe our principal food. We, in the next place, observe the variety of creeping plants, from the tender bind-weed to the vine. We cannot too much admire the perfect harmony, as well as the variety of the works of nature. Every plant, from the hyssop which grows on walls, to the cedar of Lebanon, have the same essential parts. A little herb is as complete a plant as the most beautiful rose, and the rose is not less so than the finest oak. All belong to the same source; all follow the same general laws of growth, propagation, and multiplying, and yet each species is distinct from the other. Among so many millions of plants, there is not one which has not its distinct character, properties, and particular manner of taking nourishment, of growing, and continuing its species. What inexhaustible riches in their colours, forms, and proportion! Those are happy who are capable of observing this variety, and of tasting the many different beauties

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of the vegetable kingdom. What pleasure may not the mind experience in such a study! After having once enjoyed it, we should find so many charms in it, that we should readily give up all others, to devote ourselves entirely to this. Our souls, enraptured with sweet contemplations, would rise to Thee, O God, who art the Father of all nature. Thy power, which produced every plant, thy wisdom which so well planned them, thy goodness, which appears in the infinite variety of them, furnish us with continual cause to bless and glorify our Creator.

AUGUST XXIII.

Reflections on the Animal Creation.

WE may consider the animal kingdom as a well-governed state, in which there are a proper number of inhabitants, each in the place appointed for them. All have the faculties necessary for the employments designed them. They are induced by rewards and punishments to fulfil their destination, and are protected as much as they require from their several enemies. In this animal kingdom, the little and the weak, which compose the greatest part of it, are subject to the strong and the powerful; but the whole are subject to man, as to the representative of the Deity. Animals find in every part of the earth enough to employ them, and enough to feed on. They are accordingly dispersed throughout, every where; and their nature, their organs, their several constitutions, are adapted to the different situations designed them. Their employments differ greatly. All tend either to increase their species, to maintain an equal balance between the animal and the vegetable kingdom, to provide proper food, or to defend themselves from their enemies. Let us ob-

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serve, that every part of their bodies is suited to their offices, and to the nature of their souls The Creator has given them an instinct to compensate for the want of reason: an instinct varied in a thousand ways, and according to their several wants; an instinct for motion, for food, to enable them to distinguish it with certainty, to find it out, to seize upon it, and to prepare it; instinct to build nests and proper habitations; to lay in provisions; to transform themselves; instinct for the increase of their kind; instinct to defend and secure themselves, &c. In each class of animals, there are some which live on prey, and individuals which superabound in other classes. Each species has its particular enemies, which keep up the proper balance, and prevent any from multiplying too much. The fruit and the carcases which corrupt are eaten up; the earth is not incommoded by them, nor the air infected. Thus nature preserves its beauty, freshness, and purity. The beasts of prey have a make conformable to their design. They are endowed either with peculiar strength, agility, industry, or address. But in order to prevent them from destroying a whole species, they are confined within certain limits. They do not multiply so fast as other animals; and they often destroy one another, or their young are food for other creatures. Some sleep during winter, digest slowly, and feed on fruits of the earth, for want of other food. The weaker animals are provided with defence in proportion to their situation, and the dangers to which they are exposed. Their natural arms, their swiftness their habitations, their scales, or shells, their cunning, preserve them from destruction; and by these means the proper balance is always kept, as to the number in every species of the brute creation. Animals are in some measure constrained to acquit themselves of the part assigned them, because their happiness depends upon it. They

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find their well-being in following the rules prescribed by nature; as, on the contrary, they could not transgress them, without drawing all sorts of evil upon themselves. The animals which give milk are the largest, and consequently the least numerous, but they fulfil very important offices. Those of birds are also various. They eat the superfluous seeds; they devour carcases; they diminish the number of every sort of insects. Most amphibious creatures prey on other animals. The smallest animals are the most numerous, and in proportion more voracious than the larger. They make many vegetables fruitful, and serve for other useful purposes. All we behold so admirable in the animal kingdom, proves the existence of a Being who possesses the highest degree of wisdom and understanding. Who but he could have peopled this immense globe with so many different species of living creatures, providing for them every thing necessary? Who but he could give food to such an infinite multitude of creatures, according to their different tastes, and find them clothing, habitations, and whatever they require, to guard and defend themselves with so much address and sagacity, so many instincts, and such industry? Who but he could have kept up the equal balance between so many different species and classes of animals? Who but he could appoint for each living creature the element suited to it; or form that amazing number of limbs, joints, bones, muscles, and nerves, joined together, and placed with so much art, harmony, and perfection, that each animal can perform its several motions, in the manner most convenient and best adapted to its way of life, and the different situations it is in?

O Lord God Almighty! it is Thou only who couldst do such things, and to Thee belong all glory, praise, and thanksgiving.

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AUGUST XXIV.

Division of the Earth.

ALL the known countries of the earth are divided into four principal parts, Europe, Asia, Africa, and America.—Europe is the smallest, for it is but 900 German miles in length, and 1500 wide. The Europeans, however, possess countries in the three other parts of the world, and have subdued near one half of the earth.—None but the Europeans travel into the four quarters of the globe, to carry home the produce of all the different countries; nor are there any people so well informed as they are, or who cultivate the arts and sciences with more success. Europe is the only part of the earth which is every where cultivated and covered with towns and villages; the only place where the inhabitants keep up a constant intercourse, and profess nearly the same religion. The three other parts are inhabited by a multitude of different nations, which have no connection with one another; who are scarce acquainted; and who differ greatly in their manners, way of living, and in their religion.—Asia is the largest known continent: it is between 1500 and 2000 German leagues long, and 1200 wide. As the countries that are in the interior of this part of the world do not enjoy the cool sea breezes, as they are not watered by many rivers, as they have vast plains and barren mountains, the heat and cold are in the extreme. The earth is unfruitful, and consequently never well cultivated. Even at this time, those countries are only inhabited by people, who, in the morning, pull down their towns and villages to carry them some miles farther, and build them up again at night in an hour. It seems as if nature had made this wan-

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dering and unsettled life necessary; and intended that the establishment, laws, and government of these people should be less durable, and more subject to change, than elsewhere. The other people of Asia often suffer greatly from the restless and unquiet character of these wandering nations. The northern parts, which are full of lakes, marshes, and forest, have never been regularly inhabited; but the southern, eastern, and western countries are the finest in the world, and are wonderfully fertile, producing the necessaries of life in great abundance.—Next to Asia, Africa is the largest part of our hemisphere, since it is a thousand leagues square. As it is under the torrid zone, there are immense sandy deserts, mountains of prodigious height, forests burnt up, and monsters of every sort there. The oppressive heat enervates and weakens every faculty of the soul there. The innermost part of Africa is still almost unknown; though that quarter of the world is the nearest to Europe.—America was not discovered by the Europeans till within some centuries. It is divided into two continents, separated only by a very narrow isthmus, or neck of land, and surrounded by a great many islands. The cold climate of the northern part, its few productions, and its distance from inhabited countries, prevent its being entirely known as yet; but we have every reason to believe that the natives are uncivilized. The earth there is still covered with forests and marshes; and hitherto the Europeans have only cultivated the eastern coasts. In the south of America there were formerly some great nations. The remainder was inhabited by savages. It is the country for serpents, reptiles, and insects, which are much larger there than in Europe. It may be said, on the whole, that America is the country of greatest extent, but with the fewest inhabitants.

If we reckon the number of leagues these four

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parts of the globe occupy, their size will appear very considerable; and yet all the known countries make but a fourth part of this earth. And what is our world in comparison with those immense bodies which God has placed in the firmament. It is lost in the numberless multitude of celestial globes, like grains of sand in a great mountain. However, to us, in whose eyes a cubit appears considerable, the terrestrial globe is still a great scene of the wonders of God. And as we know but little of the worlds above us, let us at least endeavour to know that which we inhabit, and to turn that knowledge to the glory of God.

AUGUST XXV.

The Nature and Properties of Light.

WE every moment experience the use of light, but we cannot with certainty decide the nature of it. All that has been said on the subject is conjecture. Perhaps, light is a fluid substance by which we are surrounded, and which only may require, in order to be perceptible, the being put in motion by the sun or some other fiery body: or, perhaps it is the fire itself, which, by the infinitely subtile particles issuing from it, gently strikes our eyes at a certain distance. The first of these hypotheses has been adopted by the most famous naturalists. It is certain, at least, that there is a great difference between fire and light. The latter is beyond all comparison more subtile than fire. It penetrates glass, and other transparent bodies in a moment; whereas fire does it very slowly. The pores of glass, consequently, must be large enough for the light to pass through them easily; while the fire meets more resistance, because it is less subtile. It is observable that

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fire moves more slow than light. Let burning coals be put in a room, and the heat will spread but slowly, and the air will only grow warm by degrees; but as soon as a lighted candle is brought into a room, it is suddenly lighted by it, and seen wherever its rays can reach. From these and some other facts, we conclude that fire and light, are different substances, though we generally see them both together, and though one can occasion the other. But we may very possibly draw some false consequences from hence. The properties and effects of light are not less incomprehensible than its nature. If its swiftness was not greater than that of sound, it would take up seventeen years to come from the sun to us, but it only requires from seven to eight minutes to do so. In that short time, a ray of the sun darts over many millions of leagues, and in a second, goes over twenty thousand. Now, as sound reaches only 1142 feet in a second, a globule of light must be 500,000 times more subtle than a particle of air, although the latter is not visible to the naked eye, nor even with the best magnifying glasses. Besides, the observations of astronomers inform us, that the rays of a fixed star, in order to reach us, must go farther than a cannon-ball, shot with the greatest force, could go in the space of 104,000 millions of years. The extent or expansion of light is not less inconceivable. The space in which it spreads has no limits but the universe itself, the immensity of which exceeds the capacity of the human understanding. This almost boundless extent is the cause of the most distant objects (for example the heavenly bodies) being discernible with the help of telescopes, or even by the naked eye. And if we had optical instruments which could extend our sight as far as the light can spread itself, we should be enabled to see bodies in the most distant extremities of the

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universe. It is certain, that our understandings are too limited to investigate the nature and properties of light. But we might explain many things, if we gave proper attention to them.—Why, for example, does light spread on all sides with such prodigious swiftness, if it is not in order that an infinite number of objects should be seen at the same time by a vast number of people? Do not the rays dart so rapidly, for the purpose of discovering to us quickly even the most distant objects? If the increase of rays acted more slowly, there would result from thence great inconvenience. The light would not be near so strong or bright, the rays would not penetrate so well, and the darkness would be dissipated but slowly and with difficulty. Why are the particles of light so wonderfully subtile, if it were not in order to paint even the most minute objects to the eye? Why is there not more density in these particles? Why are they so thin, if it is not to prevent them from dazzling us with their brightness, or hurting us by their heat? Why are the rays refracted in so many ways, if it is not to make objects more distinguishable to us?

Thus the Creator ever has in view the benefit and happiness of his creatures. What gratitude do we not owe to the Father of light, for such beneficent plans! If he had not created light, how could we enjoy life! How many sources of pleasure should we be deprived of! And how narrow would the limits be of our knowledge and our occupations?

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AUGUST XXVI.

The Formation of Birds.

BIRDS may undoubtedly be ranked among the most beautiful creatures in the world. The form of their bodies, even in its least parts, is so regular and perfect, that it is enough to convince us of the wisdom of the Creator. They, as well as those animals who give milk, have real bones; but they are very differently clothed. Their bodies are covered with feathers fastened into the skin, laid one over another in regular order, and furnished with a soft and warm down. The large feathers are covered again, over and under, with smaller feathers. Each feather has a quill with beards. The quill is hollow at the bottom, and from thence the feather receives its nourishment. Towards the top it is full of a sort of marrow. The beards are a range of little thin flat flakes, pressed close to one another on both sides. Instead of the fore legs of the quadruped, the birds have two wings. They are composed of eleven bones, into which are set the feathers intended for flight. These feathers, turned back, form a sort of arch, strengthened still more by two rows of smaller feathers, which cover over the root of the large ones. The mechanism of the wings is truly admirable: they do not strike behind like the fins of a fish, but they act perpendicularly against the air which is under them, and which assists the flight of the bird greatly. The wings are a little hollow, in order to collect more air; and yet they are so close, that no air can penetrate through them. The body is suspended between the two wings in a perfect balance, and in the manner best adapted for the motions it is to perform. The heads of birds are small, that the weight may not retard the vibra-

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tion of the wings; and to be more proper to cut the air, and make their way through that element. The principal use of the tail is not to supply the place of a rudder; but it particularly serves to preserve the balance in flying, and to assist the bird in rising into the air, and descending again. The legs, never more than two, are generally so placed, as to keep the body in the centre of gravity. Some birds have them more behind, and can only make use of them in swimming. The legs are composed of the thigh, of the leg, properly speaking, and the claws. The thighs are covered with muscles, and almost always with feathers. As for the legs, they are thin, and generally without feathers. Most birds have four toes, three of which are before and one behind. At the end of the toes they have nails, which they make use of either to perch, or to seize their prey, and to take up their food. Some birds feed on animals, others on plants and seeds of plants. Those which live on seeds, steep and soften them in their crop; from whence there can pass but little food at a time into the stomach, because in this sort of bird it is but small. Their stomachs are composed of very strong muscles, by means of which the food is so much the better bruised and ground, as those birds generally swallow sand, and little hard uneven stones, to assist digestion. Birds of prey have much weaker stomachs, but they also have recourse to stones to facilitate its functions. The bodies of birds are formed, throughout the whole, with such art and harmony, as to be perfectly adapted to their way of life, and their different wants. The stork and the heron, which must seek their food chiefly in marshes, have long bills; and are raised high, that they may run into the water without wetting themselves, and yet go very far in to reach their prey. The vulture and eagle, who live only by rapine, are

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provided with great wings, strong claws, and sharp bills; which are necessary to keep them from starving. The swallow's bill is small and pointed; the mouth large and cut up to the eyes; on one hand, not to miss the insects they meet flying; and, on the other, that they may pierce through them more easily. The swan has in its windpipe a particular reservoir, from whence it draws air enough to breathe when it puts its head and neck under water to seek food. Several little birds, which flutter and hop among the thick bushes, have a pellicle on their eyes, to guard them. In a word, the formation of each bird is wonderfully adapted to its own way of life. Each species is perfect in its kind; and no limb is useless, superfluous, or deformed. The wisdom observable in this will appear still more extraordinary, if we consider that every part of a bird, at the same time as it is suited to their uses, also combines to adorn and give them the most beautiful form. What wonderful difference of construction, proportion, colour, and voice, do we not observe between the raven and the swallow, the patridge and the vulture, the wren and the ostrich, the owl and the peacock, the crow and the nightingale? All these birds are beautiful and regular in their kind; but each has its peculiar beauty and regularity.

Thus may the sight of birds become useful and edifying to us, if we accustom ourselves to trace them up to God that created them. Happy for us, if we make this use of his creatures. What an agreeable employment, what pure and celestial pleasures may not such reflections afford!

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AUGUST XXVII.

Reflections on the Sky.

WE need only cast our eyes on the sky, to be struck with admiration at the sight of this magnificent work of the Creator. With what lustre shines this rich canopy over our heads, particularly in the night, when millions of stars appear, and when the moon sheds its mild light from far! Who can raise their eyes, and contemplate this beautiful sight, without astonishment, without the sweetest emotion! But we discover still greater wonders, when, with the mind's eye, we traverse that immense space, and make it the subject of reflection. Where are the bounds to this space? Where the beginning or the end of it? Globes without number, and of a prodigious size, rise there one above another, and the human mind, that would attempt to follow them in their rapid courses, soon would discover its weakness. A pure etherial air, infinitely subtile, fills that space, supports those prodigious bodies, and traces for them the circles in which they continually run. There are no props or pillars to support this immense vault. It is not suspended or fastened to any thing, and yet it has supported itself for thousands of years, and will continue to do so for ever. What a number, and how great the size, of those celestial bodies with which the sky is filled! The size of the sun, and of many of the planets moving round it, much exceeds that of our earth. And who knows how many there are of the other stars which may yield to them in nothing, and may even be still more considerable! Their prodigious distance makes them only appear to us as little lights sparkling in the sky. But in reality, they

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are so many suns, the immense circumference of which cannot be measured. With the naked eye we behold innumerable celestial bodies, when the absence of the sun in the night permits us to see them shine. How many more do we discover with telescopes! It is also probable, that there are many out of the reach of our best glasses. We may venture to assert, that many millions of suns and worlds roll in the firmament, and that our solar system is but the smallest part of that great multitude ranged above us in such beautiful order. But the heavens present still greater wonders to an attentive mind. Those bodies are in a perpetual motion, which is subject to invariable laws. They all turn round their own axis, and most of them also run immense courses round other globes. One particular path is appointed for each of them, from whence they never deviate. They run their course with a swiftness which passes all imagination. They have a force by which they fly from the centre, and yet an equal force retains them within their orbit. Though so many millions of bodies move in the same space, they never hit against or incommode one another. Those stars which appear to us confusedly spread in the firmament, are, on the contrary, placed in the greatest order and the most perfect harmony. They have risen and set regularly in the same manner these thousands of years, and astronomers can foretel exactly their position and course. What new subjects of admiration should we have, if we were better acquainted with those innumerable globes! But we know little, except the system of which our earth makes a part, and of which the sun is in a manner the head or chief.

Who can look up and contemplate the sky, without being struck with astonishment at the thought of the great Being who framed such magnificent works? Let our admiration lead us to humble ourselves lowly before him, to adore

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and glorify him. And when we reflect how poor and imperfect our homage is, let us comfort ourselves with the thought of that happy revolution we shall one day experience, when the nearer contemplation of the wonders we now see but faintly at a distance, will make our hearts overflow with gratitude and joy.

AUGUST XXVIII.

Moral Reflections on seeing a Field of Corn.

THIS field was lately exposed to great danger; impetuous winds whistled round it, and the storms often threatened to beat down and destroy the wheat. However, Providence has preserved it hitherto. It is thus that the storms of affliction often threaten to overwhelm us. But this very tempest is necessary: it purifies and roots out the tares of vice. In the midst of trouble and sorrow, our knowledge, faith, and humility, increase and strengthen. It is true, that, like the weak ear of corn, we sometimes bend and are bowed down to the ground; but the merciful hand of our Father supports and raises us up again. Towards harvest-time, the corn ripens fast. The dew, the heat of the sun, and the rain, all combine to hasten it. O! may we, from day to day, grow ripe for heaven. May all the events of our lives lead to that salutary end. Whatever be our situation here; whether the sun shines upon us, or is wrapt up in clouds; whether our days be gloomy or serene; no matter, provided all concur to increase our piety, and dispose us better for eternity. It is very remarkable that the ears of corn, loaded with grain, differ considerably in height from those that are poor and thin. The latter are upright, rise high, and overlook the whole field; whereas the others bend under their

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comfort us in our sorrow, and make us wait with patience for the day of harvest.

AUGUST XXIX.

Shell-Fish.

THE shell-fish, or testaceous animals, are numerous. They live in houses of a substance more or less chalky, which may be considered as their bones. Their shells are either single, that is to say, in one piece; bivalves or multivalves, that is to say, composed of two or more pieces. The testaceous animals form two large families; the muscle, the shell of which is in several pieces, and the snail, whose shell is in one piece only, and generally spiral. The construction of the former is much more simple than that of the latter. The muscles have neither head, nor horns, nor jaws; there can only be distinguished in them a wind-pipe, a mouth, and sometimes a sort of claw. Most snails, on the contrary, have a head, horns, eyes, a mouth, and a claw. There is a great difference among the shell-fish: some are oviparous, others viviparous. The testaceous are born with their shells upon them; but in proportion as the animal grows, its house, the inner partition of which is lined with a very fine membrane, grows also; not only in thickness, by layers or leaves one over another, but in circumference, as the circumvolution, or spires, multiply more and more. The shells are formed by means of a slimy liquor, which is produced by the perspiration of the animal, and which gradually thickens and grows hard. But whether the shells grow by an exterior juxtaposition, or by a common inward nourishment, is not certainly determined. It is more probable that it is by the former means. Most shell-fish live in water, and

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particularly in the sea; sometimes near the shore, and sometimes in the main ocean. Some are carnivorous; others feed on plants. Some keep at the bottom of the sea, or adhere to rocks, and remain motionless. Oysters, and other animals with hard shells, fasten themselves to different bodies, and stick to them by means of a sort of glue, or chalky liquor; and are often heaped and fastened one upon another. This adhesion is voluntary in some shell-fish, who cling to any thing, according as circumstances oblige them to it; but it is involuntary in others, which always remain motionless on the rocks to which they are fastened. The knowledge we have of these animals is still very imperfect. As they mostly live in the bottom of the water, it is very difficult to make exact observation on their formation, their feeding, their motions, &c. There are only three or four different classes of shell-fish yet known; but it is very probable that an hundred more would be discovered, if it was possible to search into the bottom of the sea, or into rivers. Hitherto we have scarce attended to any thing but the beautiful forms and colours of the shells, while the true construction and way of life of the animals that live in them are still little known to us, nor do we scarce know the purpose of their existence. But even these, as far as we know of them, are subjects sufficient to lead us to admire the infinite greatness of God. We every where find creatures, which, each in their way, bear the impression of the majesty of the Lord. To feel this truth, we need only look into the cabinets of shells that are collected, and there observe the prodigious variety, in their size, their form, the richness and beauty of their colours. Here the hand of God visibly shews itself; and every thing convinces us, that all his designs are worthy of his wisdom.

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AUGUST XXX.

On the Government of God.

A GOD who from his supreme height could be an indifferent spectator of all the revolutions which happen in this world, would not merit our homage. Happily for us, the government of the God whom we adore takes in all his creatures. We every where find the centre of his empire, but we no where see its bounds. All his works are continually before him. At one glance he beholds the past, the present, and the future, and comprehends all the combinations and relations between them. The least events, the smallest circumstances, nothing escapes him; every thing together enters into the plan he has laid down to compass the infinitely wise and gracious purposes he formed. And these purposes unite and combine, to procure for his creatures the highest possible degree of happiness. God takes pleasure in his works; he sees them with one glance, and rules them by a single act of his will. His laws are dictated by wisdom, and his commands are a source of joy and happiness. God, by his providence, preserves every species of creatures formed from the beginning of the world. Animals die, and others come in their place. Generations of them pass away, and others succeed. The Ruler of the world makes use of inanimate creatures to preserve the living, and to make them happy. Lastly, He makes them all subject to man, who alone is capable here of knowing his works, and of adoring him. This God, who is goodness itself, expects that his rational creatures should be good also. By the proofs he continually gives of his love of righteousness, and his horror of sin, he speaks to the heart, and constantly persuades

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us to walk in the paths he has prescribed. He directs our actions according to his views. He makes our understandings fail when they are contrary to his merciful designs; and he gives us means of quitting the paths of iniquity. What wise measures he took in order to lead the children of Israel to the salutary ends that he proposed! In vain did the idolatrous nations more than once conspire their destruction; they were still preserved by the protection of their God. He neglected nothing to maintain amongst them that pure and holy religion which distinguished them from the blind and superstitious nations around them. But our God inhabits light inaccessible. There is a depth of wisdom in his government, which none but he can fathom. Our understandings are too weak to see through the whole of his plans, or to form a just idea of his views, before the event has discovered them. Our knowledge is too limited to penetrate into the counsels of an infinitely wise Being, or to discover before hand the motives of his dispensations. The wicked man often sits among princes, whilst the righteous are humbled in the dust. The wicked triumph, and the good man is oppressed. Every thing smiles on the bad, whilst the friend of God meets nothing but disgrace and disappointment: and yet there is a Providence. Yes: notwithstanding all these apparent disorders, the Lord is ever the tender Father of all his creatures. He is their infinitely wise God, their just and equitable Ruler. All his dispensations are adorable, however impenetrable they may appear to us. His counsels are wonderful. His plans surpass our understanding, but they are always formed and executed with sovereign wisdom. All that happens in this world, and at which we often wonder, tends to excellent purposes. The load of affliction and misery, under which some groan, may possibly have the happiest effect on their future state.

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The apparent evil may perhaps be a necessary medicine for the soul, and on this salutary correction may possibly depend their faith, the purity of their hearts, and their eternal felicity. Whoever is discontented with his lot, let him consider all these things, and he will cease to murmur. Why, O man! dost thou undertake to fathom the plans on which God governs the world? Thy understanding is limited, and yet thou pretendest to discover the views which the Supreme Being proposes to himself. Thou canst not take in the whole chain of things which pass before thee. Thou knowest not what has preceded, or what is to follow; and yet thou hast the presumption to judge of causes and effects. Providence is just in all his plans, and all his dispensations. It is true, that thou seest not always the motives of his conduct, but, to be able to judge of them rightly, thou must be what God is.

AUGUST XXXI.

Harvest-Hymn.

OUR fields crowned with blossoms and with corn are a hymn to the Lord. The joy that sparkles in the eyes of the farmer is a hymn to the God of nature. It is he who makes the earth produce bread, and he that loads us with blessings. Let us gather together and sing praises to the Lord. Let his praise be evermore the subject of our song.—Let us hearken unto the words he says unto us from the bosom of our fertile fields: "The year will crown thee with blessings, O world! thy happiness is my work, and I have called the spring; the crops and the harvest are the works of my power. The rich meadows, and the hills covered with corn, are mine." Yes, Lord, we behold thy greatness, and we feel the value of thy

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favours. It is through Thee that we exist: life and food are the gifts of thy hands. Blessed be thou, O field, which producest food for man!—Prosper, thou beautiful meadow! Be covered, ye forests with a thick shade! O Nature, be thou ever beneficent towards us! Then, from morn to night, will the Lord be the object of our praise. Free from cares, we will rejoice in his blessings; and our children will repeat after us, The God of heaven is our Father, the Lord, the Almighty Lord, is God!

SEPTEMBER I.

The Omnipresence of God.

THOU art present every where, O Almighty God! Thou art here. Thou art afar off. Thou fillest the whole universe. Here grows a flower; there shines a sun. Thou art there, and Thou art here also. Thou art in the wind, and in the tempest; in the light, and in the darkness; in an atom, and in a world. Thou art present here upon this flowery vale. Thou hearest my weak voice, as Thou hearest, at the foot of thy throne, the sublime songs which are accompanied by the seraph's lyre. O Thou, who art the God of the seraphim! who art also my God; who hearest us both; who hearest also the sprightly notes of the lark, the hum of the young bee that flutters round the rose,—Thou Being that art present every where! if thou hearest me, vouchsafe to grant my request, that I may never forget my being in thy sight. Grant that I may act and think as I ought to do in thy presence, to the end that, when summoned with the whole world of spirits before the tribunal of my Judge, I may not be obliged to fly from the presence of the Holy of Holies.

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SEPT. II.

The Beauty and Variety of the Butterflies.

LET us reflect on these pretty creatures before they are gone. Perhaps our observations will interest both the heart and the mind. The first circumstance that gains attention, is the clothing with which they are adorned. Of some of them, however, the dress is plain and simple. Others have a few ornaments on their wings: but some have a profusion, and are all over covered with them. Let us dwell a few moments on this last sort of butterfly. How beautifully the shades variegate! How pretty the spots, which set off the other parts of their dress! With what delicacy has Nature penciled them! But, however great my admiration in seeing this insect with the naked eye, how much does it still increase when I examine the beautiful object through a microscope? Would any one ever have imagined, that the wings of butterflies were covered with feathers; and yet nothing is more certain. What is commonly called dust, is found in reality to be feathers. There is as much symmetry in their construction and form, as there is beauty in their colour. The parts, which make the centre of these little feathers, and are next to the wing, are the strongest. Those, on the contrary, which form the exterior circumference, are much more delicate, and most wonderfully fine. All these feathers have quills at bottom; but the upper part of them is more transparent than the quills. If the wing is touched roughly, the most delicate part of the feathers is destroyed by it; but if all that we call dust should be rubbed off, there would only remain a fine transparent skin, in which we might distinguish the little cells, or hollows,

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wherein stick the quill of each feather. This skin, from the manner in which it is composed, may be distinguished from the rest of the wing, nearly as we distinguish a fine lace from the linen on which it is sewed; it is more porous, more delicate, and seems as if embroidered with a needle. Lastly, it is edged with a fringe, the most regular, and most exquisitely fine. What are our most elegant dresses in comparison with that which Nature has given to this insect? Our finest laces are a coarse cloth, compared to the delicate texture of the butterfly's wing; and our finest thread would be as a rope. Such is the extreme difference we observe between art and nature, when seen through a microscope. The former, even the prettiest in their kind, are never complete, and appear coarsely worked: the latter are as complete and perfect as can be imagined. How very delicate does a fine cambric appear to us! Nothing more delicate than the threads, nothing more regular than the weaving: and yet, through the microscope, those fine threads are like pack-thread; and we should rather suppose they were interwoven by a basket-maker, than come from the loom of a good weaver. What is most astonishing, this beautiful insect proceeds from the poorest, meanest looking worm. Observe how the butterfly displays its golden wings in the sun; how it plays in the sun-beams: how it rejoices in its existence, and flutters from flower to flower. Its brilliant wings paint to us the magnificence of the rainbow. How much it has changed since the time, when, in the form of a reptile, it crawled in the dust, always in danger of being crushed! Who then has raised it above the earth? Who has given it the faculty of living in the air? Who has bestowed upon it these painted wings? It is God. It was its Author and ours. He has shewn us this extraordinary insect, the emblem

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of the transformation which awaits us. A day will come, when, quitting our present form, we shall cease to crawl upon the earth. Being made perfect, and having nothing to set bounds to our flight, we shall then soar above the clouds, even beyond the stars themselves.

SEPT. III.

The Growth of Trees.

EVERY tree, however rich its foliage may be, receives its chief nourishment from the bottom or root. We have reason to believe that there is a circulation of juices in it, like that of the blood in animals. The exterior points of the root are a prodigious heap of spongy fibres, and bubbles of air, but are always open, in order to be filled with the juice they receive from the earth. This juice is at first nothing but water loaded with earthy matter; then by means of a sort of milky substance, which is peculiar to each tree, and distinguishes it from any other, this juice acquires a nutritive quality: it is found by the microscope, that wood, notwithstanding its hardness, is nothing but a collection of an infinite number of little hollow fibres. Most of them, particularly those in shrubs, rise perpendicularly: But in order to give more consistency to these fibres, there are in certain trees (especially those that are designed to be strong and hard) stalks which go horizontally from the circumference to the centre. Drawn by the heat of the sun, the juice gradually rises into the branches, and into their extremities, just as the blood, which flows out of the heart is conveyed through the arteries to the extremities of the animal body. When the juice has reached every where that was necessary, what remains of it rises through large ves-

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sels, which lie between the inner and outer bark, in the same manner as the blood returns back through the veins. From this results a growth which renews every year, and it is this which causes the tree to grow thick. To be convinced of it, we need only cut a branch across, to know the age of the tree. While the stem grows higher and higher, the root at bottom increases in proportion. As for the outer bark, it seems intended to serve in some measure as a sort of coat for the tree, to unite also closely the parts it is composed of, and to guard the tender, though essential parts, from accidents, and from the intemperature of the air. It is thus that the wise Creator has formed an admirable system of solids and fluids, in order to give life and growth to the trees which adorn the country, which give shade to our flocks, our shepherds, and hamlets, and which, when cut down, serve so many purposes useful to mankind. Here we discover a wisdom which is never mistaken, which prescribes to nature laws in some respect immutable, and which act without interruption under the eye of Providence. A wisdom so profound, an art so wonderful, so many preparatives and combinations for each tree, ought to lead us to revere and admire more and more the creative hand. The contemplation of this wisdom is a charming study, and animates us to glorify this God, so great in his counsels and plans, and so wonderful in the execution of them. The more traces we discover of this Wise Providence, the more it ought to lead us to put our trust in him, who cannot fail of means to make every thing turn to the advantage of his creatures: and to look up to him, and pray that he may enrich our souls with wisdom and virtue, that we may improve daily in both.

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SEPT. IV.

The Formica Leo, or Lion Ant.

NO insect is more famous for its dexterity than the *formica leo*, although its form promises nothing extraordinary. It is something like the wood-louse. It has six feet, and its body, which is composed of several membraneous rings, terminates in a point. Its flat square head is armed with two moving hooped horns, the singular construction of which shews how admirable nature is, even in its smallest works. This insect is the most cunning and dangerous enemy the ant has. The plans he forms to catch his prey are most ingenious. He undermines a piece of ground, in the shape of a funnel, in order to stay at the bottom of it, and draw down any ants which may chance to come to the brink of this precipice. The method of digging it is, first to trace a circular ridge in the sand, exactly the size of the funnel, the diameter of which is always equal to the depth he chooses to make it. When he has fixed on the size of this opening, and traced the first ridge, he immediately digs a second concentric to the other, in order to throw out all the sand inclosed in the first circle. He performs all this with his head, which is like a shovel; the flat and square shape makes it fit for the purpose. He also takes up sand with one of his fore teeth, and throws it over the first ridge; and this he repeats till he has got to a certain depth in the sand. Sometimes in digging he meets grains of sand rather large, or little bits of dry earth, which he cannot bear in his funnel, and gets rid of it by a quick well measured motion of his head. If he finds still larger pieces, he endeavours to put them away with his back; and he is so earnest in his labour, that he

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repeats it six or seven times. His traps once laid, he is on his watch. Quite still and concealed at the bottom of the hole which he has dug, he there waits for the prey which he could not pursue. If an ant comes to the brink of the precipice, it seldom fails of falling into the bottom, because the edge goes sloping, and the loose sand, which gives way under his feet, draws down the insect into the power of his enemy, who drags him with his horns under the sand, sucks the blood, and feasts upon it. When there remains nothing but the dry carcase, he throws it out of the hole; and if the bank is hurt at the top, he puts it in order again, and lies in ambush, as before. He does not always succeed in catching his prey the moment it falls. It often escapes, and endeavours to run up again to the top; but then the formica leo works with his head, and throws up a shower of sand higher than the ant, which drives it down again into the hole. All the actions of this little animal contain such wonderful art, that we can scarce tire of examining him. He prepares the hole even before he sees the insect destined to become his food, and yet his actions are so regulated, that they prove the surest means of providing for his subsistence. How could such an inactive creature as this catch his prey so well as by digging in loose sand, and giving a sloping form to the hole he makes, and then covering with a shower of sand the insect which falls into it? All its actions have fixed principles, by which he is directed. His ditch ought to be dug in the sand, otherwise it would not be adapted for attracting his prey. According to the make of his body, he is obliged to work backwards, and to make use of his horns as tongs to throw up the sand to the edge of the funnel.

The instinct which directs this insect, discovers to us a First Cause, whose foresight knew and ordained all that was necessary for the preservation

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and welfare of this animal. The dexterity it shews is not the effect of experience or practice: it is born with it. We must therefore seek its source in that great Being who proportions the instinct of animals to the degrees they require. These reflections lead us to the Creator of all things, who has formed even this insect so as to make its existence a blessing; and by its instinct, however limited, in some respects endows it with an ingenuity approaching to and in some measure surpassing reason. His design in this has evidently been to furnish us with opportunities of knowing him; consequently, every insect, however insignificant, ought to raise our thoughts to God, who has created the worm as well as the elephant, and extendeth his care equally to both.

SEPT. V.

Conformity between Plants and Animals.

IT is more difficult than we think to distinguish and decide what difference there is between plants and animals. It is by imperceptible degrees that Nature descends from the latter to the former, and it would require the penetration of an archangel to distinguish the degrees exactly. But what we may perceive is, that, with all the differences found between these two sorts of organized bodies, there still remains much resemblance.—The seed is to the plant what the egg is to the animal. From the former springs a stalk which had been concealed under the coats of the seed; and this stalk makes an effort to rise out of the ground. The animal, likewise inclosed in the egg, pierces the shell, in order to breathe the open air. The eye or the bud of the tree is, in the vegetable kingdom, what the embryo is to the animal. This eye does not pierce through the bark till it has come to a

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certain size, and it remains fastened to it, in order to receive nourishment from it, as well as from the fibres of the plant. The embryo, at the end of a certain time, comes from the womb into life; but even then it could not long subsist if it was not nourished by its mother. The plant feeds on nutritive juices which are brought to it from without, and which, passing through different channels, at last change into its own substance. The animal's food has the same course and progress. Plants are multiplied not only by seed, and by ingrafting, but also by slips. It is the same with animals: they multiply not only by laying eggs, or by bringing their young alive into the world, but also by slips, as we observe in the polypus. The disorders or maladies of plants have either external or internal causes, as is the case with animals. Lastly, death is the common lot of both, when old age, having dried up and obstructed the vessels, stops the circulation of the juices. The plants and animals inhabit the same places. The surface of the earth, and under it, the air, the sea, and the rivers, are full of animals and plants. They are both extremely numerous, though the animals are more in number than the plants. The size of the largest tree is very near equal to that of the largest animal. Thus one might be tempted to believe that animals and plants are beings of the same class, since Nature appears to pass from the one to the other by imperceptible degrees. It is very certain that some general and essential resemblances have been found between them, and that no difference really essential has yet been discovered. And though some should be found out which have not yet been observed, it is still certain that Nature varies her works by such nice shades, that the human understanding has a difficulty in discerning them. Perhaps plants may hereafter be known with properties still more like those of the animal bodies, and

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perhaps animals may be found out still nearer the class of vegetables than the polypus.

Let us make the use of these discoveries, for which all the truths of nature and revelation are designed, to glorify God, and to strengthen us in virtue. Let the great resemblance between plants and animals make us sensible of the power and wisdom of that Being who has in some measure impressed a character of infinity on all creatures. But thou, O man! learn also to be humble. Thou also partakest of the nature of a plant and animal. It is only through our Saviour that thou canst be ranked between the brute creation and the angel. Endeavour by piety to draw more and more near to those heavenly spirits.—And since it is granted thee to have some part of similitude to the Being of beings, endeavour constantly to arrive at that sublime felicity. Think what thou art, and what thou wilt one day be. How wonderful is that creature, who, like the brute, draws his nourishment from the earth, and yet raises his thoughts to Heaven, as the angel does: a creature, one half of whom perishes like the brute, while the other half lives and is immortal; ordained to become holy and perfect; to be free, and yet subject to God; to praise him for ever, and to be eternally happy.

SEPT. VI.

The Nature and Properties of Sound.

ALL sounds are produced by means of the air; but it is necessary for that purpose that the air should be in motion. It is not that every movement of the air occasions a sound; for if this was the case, all wind must be attended by a noise. In order to form a sound, the air must be suddenly compressed; and must dilate and extend

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again by its elastic power. This occasions a kind of trembling undulation, something like that of the waves and circles occasioned by throwing a stone into the water. But if this undulating motion was only to be effected by the particles of air being compressed, the sound would never reach our ears. It is necessary that the sonorous bodies, after making impressions on the contiguous air, should continue that impression from particle to particle circularly all about us. By this means the particles of air reach our ear, and we have a perception of sound. This progress is made with prodigious swiftness. Sound goes a thousand feet in a second of time, and consequently a German league in twenty seconds.—This circulation contributes to our security, as it tells us what distance thunder is from us; and of course warns us whether we are or are not safe when we hear it roar. We need only count the seconds or the beating of each pulse, between the flash and the thunder, and we may know exactly the distance we are from them. By the same means we may calculate the distance of ships, &c. But it is very remarkable, that a weak sound propagates as quick as a loud one. The motion of the air, however, is stronger when the sound is stronger, because a greater mass of air is put in motion. The sound, then, is loud when many particles of air are put in motion, and the contrary when there are but few. What use would these philosophical observations be to us, if our bodies were not so formed as to make us capable of perceiving sounds? Let us therefore bless God, not only for having disposed the air in such a manner as to produce sound by its vibration, but for giving us organs also capable of receiving sonorous impressions. A thin elastic membrane stretched at the bottom of the ear like a drum, receives the vibrations of the air; and by that means we have the power of dis-

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tinguishing sounds. But if we enquire how it is that, when we pronounce a word, it creates in us the idea of a word, and not a mere sound, or how a tone can act upon our souls, and produce so many different sensations, we are obliged to acknowledge our ignorance of all this. It is enough for us to be convinced by this, as by every thing else, of the wisdom and goodness of our Creator. If there were no sounds, all mankind would be dumb, and we should be as ignorant as a child before it can speak; but by means of sounds every creature can express its wants and its enjoyments. Man has in this respect great advantages: he can express the sentiments of his heart, and even excite the passions, by certain tones of his voice. God has not only endowed us with the faculty of distinguishing sounds by the organ of hearing, but he has also furnished us with other means of preserving this blessing. If one ear should be hurt, the other still may do its office; and a man, whose hearing is imperfect, may make use of a trumpet; even when the outer auditory pipe is hurt, the internal one next the mouth may not be so. Still more, the Creator has even vouchsafed to make this a circumstance of pleasure to us; a number of musical instruments amuse and delight us; our auditory nerves transmit to us, with great exactness, the tones of an infinite number of sonorous bodies. When we reflect on this favour granted to us, our hymn of thanksgiving ought to reach as far as sound itself; and the whole universe resound with praise.

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SEPT. VII.

The Mysteries of Nature.

WHEN men attempt to penetrate into the causes of the effects daily under their observation, they are obliged to acknowledge how limited their understandings are. The knowledge we have of nature, and of which we are sometimes so vain, goes but little beyond the knowing the effects of things the most within our view, and applying them to our use as well as we can.—But as to knowing the causes of these effects, and how they operate, it is in general an impenetrable mystery. There are even a thousand effects in nature concealed from us; and those which we are able to explain, have still some obscurity in them, which reminds us that we are but men. There are many phenomena, the near causes of which are unknown to us; several are doubtful; and there are very few which we can be certain of. We hear the wind whistle; we experience its great and its different effects; but we know not exactly what produces it, what increases its violence, or what abates it. From a little grain, we behold grass spring up, stalks and ears of corn; but we are ignorant how it is done. We still less comprehend, how from a little fruit-stone there can grow a plant, and then a great tree, under whose shade the birds make their nests; which tree is covered with leaves and blossoms, to shade us, and afford us fruit to eat, and wood for our use and convenience. All the food we take of such different nature, transforms within us by an incomprehensible mechanism, and mixes with our blood and flesh. We behold the wonderful effects of the loadstone, and we believe there must be a certain matter which operates in it;

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but whether it acts by an attractive force peculiar to itself, or whether it circulates continually round the loadstone, and forms a sort of vortex, is what we cannot decide. We feel the cold; but no natural philosopher has yet discovered what occasions it. We are better informed than our ancestors were in respect to thunder; but of what nature is that electrical matter which shews itself so terrible in storms? We know that the eye observes the images painted on the retina; and that the ear has a perception of the vibration of the air; but whence is the having perceptions, and how is it caused? We are conscious of the existence of a soul in our body; but who can explain the union of body and soul, or their mutual influence on each other? The effects of fire and air are continually before us; but what is really their nature, and what are their integral parts, and how do all their different effects take place? In a word, in respect to most things, we have no certain principles. What are all the hypotheses of philosophers, but tacit confessions of the limits of our knowledge? Nature at every step presents us wonders which confound us; and whatever researches, whatever discoveries, we have made, there still remain a thousand things we cannot comprehend. It is true, we sometimes are able to give happy explanations of certain phenomena; but the principles, the first springs, their nature, and manner of operating, are certainly above the sphere of our understanding.

The mysteries of nature afford us daily lessons of wisdom, in regard to the mysteries of religion. In nature, God has placed within our reach the means of passing our temporal lives happily, although he has concealed the causes from our sight. Thus, in the kingdom of grace, he furnishes us with means of arriving at a spiritual and everlasting life, though the manner in which they operate remains concealed from us. Would

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any one refuse to eat and drink, till he knew how it is that food gives him strength, and preserves his life? Or would he neither sow nor plant, for want of having a just idea of the manner in which vegetation operates? Or would he refuse to make use of sheep's wool, till he knew how it was produced? Man observes the productions of nature; experience proves their utility, and the use he ought to make of them: and he enjoys them with gratitude to his Creator. But why do not men act as wisely in regard to the mysteries of religion! They dispute about the means of salvation; on their efficacy; on their manner of operating; and they forget to make the salutary use of them for which they were intended. O that we were as wise in the spiritual as we are in the temporal things! Instead of giving ourselves up to vain and useless speculations, let us take advantage of the means of grace which God has given us, and let us faithfully use them. It is for this purpose that they were granted to us, and not that we should search curiously into their nature and manner of operating. If we find things which we cannot comprehend, or thoroughly know, let us receive them with humility, and acknowledge the weakness of our understandings. The advantage they are to us when we make a good use of them, convinces us they are the work of a being infinitely wise and beneficent; and this is sufficient for us to know. God forbid we should be presumptuous enough to flatter ourselves with a thorough knowledge of the mysteries of nature and religion; or rash enough to dare to criticise and blame them. Let us rather acknowledge the weakness of our understandings, and the infinite greatness of God. Thus each mystery will lead us to adore that Almighty Being whose works are so wonderful, and so much above our comprehension.

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SEPT. VIII.

The Eyes of Animals.

THE reflecting on the eyes of several sorts of animals is in itself enough to convince us of the wisdom with which God has formed the bodies of his creatures. He has not conveyed the sense of sight to all in the same manner; but he has varied the organs of it, as best adapted to the different sorts of animals. Most animals have this in common, that they appear round: but in this round form there is still a great difference. Their situation in the head, where they are near the brain, which is the most sensible part of the body, is liable to great differences. Mankind, and most of the quadrupeds, have six muscles to each eye, in order to move it on both sides. The position of the eye is such, that they may look straight before them, and describe almost a semi-circle. But here already we find a difference. Horses, cows, sheep, hogs, and most quadrupeds, have also a seventh muscle, to suspend and support the eye-balls, which is necessary to them, because their head and eyes hang down, and incline towards the ground to seek their food. The eyes of frogs differ from ours. They can cover theirs with a membrane, which is transparent, though of a close texture. This defends their eyes, and guards them from the dangers to which their way of life exposes them; sometimes living in water, and sometimes on land. Flies, gnats, and other such insects, enjoy more perfect sight than other creatures. They have almost as many eyes as they have holes in their cornea. While other animals, which have only two eyes, are obliged to turn them, by means of muscles, to every object, the flies can see distinctly on all sides, uninterrupt

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edly, and without having the trouble to turn their eyes; because some of these little eyes are naturally and constantly directed to the objects around them. The fish, which live in an element more dense than ours, could not see there: and by the strong refraction of the rays of light they would be blind, though their eyes are open and well formed, if they had not a chrystaline almost round, in order to collect the rays better. They have no eye-lids, and they cannot draw in their eyes: but their cornea, which is as hard as a horn, sufficiently defends them from all danger. They formerly did not allow that the mole had sight; it is however certain, that it has two little black eyes, though not larger than the heads of pins. As this animal is generally under ground, it was necessary that its eyes should be very small, sunk in the head, and covered with hair. It is known, that the eys of snails are placed at the end of two long horns, and that they have the power to draw them in, or to raise them above their heads, to discover objects more distant. In some animals, who can neither move their eyes nor heads, this fault is compensated by a multitude of eyes, or in some other manner. Spiders have from four to six, and sometimes eight eyes, all placed on the front of a round head, with no neck. They are clear and transparent, as a bracelet set in diamonds. According to the way of life, and the different wants of some sorts of spiders, these eyes are differently placed; so that, without moving their heads, they may on all sides see the flies on which they feast. The cameleon (a sort of lizard) has the singular property of moving one of his eyes, while the other remains still; of turning one up to the sky, and looking on the ground with the other: and of seeing what passes before and behind him at the same time. The same power is observed in some birds, in hares, and in rabbits, whose eyes

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are convex, which saves them from many dangers, and enables them to find out their food more easily.

All these examples, to which millions might be added, mark visibly the tender care of the Creator for the preservation of the most necessary organs of the senses. He has pleased to convey the happy impression of light to his creatures in different ways: and we cannot but be struck with astonishment, when we reflect on the admirable art observable throughout, and the precautions which have been taken to maintain creatures in possession of this precious organ, and to guard it from the dangers to which it might be exposed. Every part of the bodies of animals is disposed in the most exact proportion, and the best adapted to their different designs. The situation of the eyes, their number and form, could not be otherwise than they are in each animal, without great inconvenience resulting from it. It was not only for ornament, but for the benefit of animals, that the Creator so varied the construction and position of their eyes. And undoubtedly one of his views in this was to teach us to acknowledge and praise his wisdom in all things. Let us make this salutary use of these reflections. If we think seriously upon the ends proposed by God, we cannot but be led to magnify his power and goodness.

SEPT. IX.

Fish.

WHO, that had never seen fish, would have believed there were such creatures? If a naturalist only knew animals that walk and breathe on land, as the rein-deer does, and was told that there were creatures in the water, so formed as to live, move, multiply, and to fulfil every animal function in

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that element with ease and pleasure, would he not treat it as a fiction; and conclude, from the effect on our bodies, when plunged in water, that it is absolutely impossible to live in that situation. It is certain, that the way in which fish live, their construction, motion, &c. are quite wonderful, and afford fresh proofs of the omnipotence and infinite wisdom of our sovereign Creator. To enable these creatures to live in water, it was necessary to form their bodies, in essential points, very different from those of land animals: and we accordingly find this the case in fish, both within and without. Why has the Creator given to most fish a slender thin body, flattened at the sides, and always a little pointed at the head, if it is not that they should swim, and cut their way better in the water? Why are they covered with scales of a horny substance, if it is not to preserve their bodies from being hurt by the pressure of the water? Why are several sorts of fish (particularly those without scales) enveloped with a fat and oily substance, if it is not to preserve them from putrefaction, and to guard them from cold? Why are the fish-bones so different from other bones, if it is not to make their bodies more flexible and light? Why are the eyes of fish sunk into the head, and why is the chrystaline round, if it is not to guard them better from being hurt, and to make them take in more light? It is evident, that in the formation of all those parts, the Creator has considered the way of life and destination of these animals. But there are still more wonderful circumstances in their construction. The fins are almost their only limbs, and yet are sufficient to perform all their motions. By means of the tail-fins, they move forward; the back-fin directs the motion of the body; they raise themselves up by the breast-fin, and that of the belly serves to balance them. The gills are their organs of respiration. These are behind their head. There are

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four on each side, the uppermost of which are the largest. They are continually swallowing water through their mouths, which is their drawing in of breath, and they cast it through their gills, which is their way of breathing out again. The blood, which comes from the heart, and flows into the veins of the gills, does not return back to the heart through the lungs, as in land animals, but it is directly dispersed throughout all parts of the body. One of the organs most necessary to fish in swimming, is the bladder of air in their belly, which communicates with the stomach. By means of this bladder they make their body more or less heavy. When this vein swells and extends they become lighter, can raise themselves, and swim to the surface of the water. When it contracts, and the air is thereby compressed, the body becomes heavier than the water, and consequently sinks down. Thus, if this bladder is pricked with a pin, the fish sinks at once to the bottom, and can no longer keep at the top of the water, and is still less able to raise itself up to it. The prodigious quantity of fish, with the great variety of shape and size, is worthy admiration. In Germany alone there are above four hundred species of fish; and who can count the numbers there are of each species? Their outward form is also greatly varied. The very largest, as well as the smallest of animals, are to be found amongst fish. Some are long, and small as a thread; others short and broad. Some are flat, cylindrical, triangular, round, &c. Some are armed with a horn; others with a a sort of sword; and others still with a kind of saw. Some have nostrils, through which they eject the superfluity of water they have swallowed. Which then ought we most to admire in all this, the power and wisdom of the Creator, in the forming and preserving of these animals, or his goodness in giving them for our use. The whole must lead every attentive observer of the works of God to

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magnify his name. What greatness appears in all the elements, in all the animals, whether they inhabit the air, the earth, or the sea! in the whale, whose back is like an island in the midst of the sea; in the gold fish, which glitters in the stream!

SEPT. X.

The Motions which belong to the Human Body and Mind.

THERE are three sorts of motions, which every one may observe in themselves, who turn their thoughts to such things. *First*, those that tend to the preservation of the human frame, such as the motion of the heart, the circulation of the blood, the action of the stomach in digestion, the work of the bowels, &c. nourishment and growth. Of the action of these vital parts, every one is wholly ignorant, not the least consciousness can be pretended of how we live; only when the machine is in any way disordered, there is generally some notice given by pain or uneasiness. The *second* sort of motions are those which we seem, as free agents, to have the command of, but over the *performance* of which we are conscious we have no power or direction. Such are all external motions, walking, speaking, handling. Here the actions follow our wish or will; but it is not *we* that direct the muscles, joints, &c. we are most of us wholly ignorant how the action is performed. Of this we have a remarkable instance in taking aim at any thing; for the hand, at the command of what is called the *will*, does for the most part follow the direction of the eye, and strikes the part intended, though we know not how. And even those actions, which seem at *first* to be directed by the will, may at *last* be performed by a mechanical habit: so that a whole band of music

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may be brought to *play* on different instruments, without attending to the notes; and a vast variety of motions may be regularly performed, but not by the power, nor even by the direction of the performers. The *last* sort of motions are those which our affections and passions excite; for these are as really *felt* by the body, as pain externally applied; and they express themselves likewise on the body by outward signs. But over these, again, that thing called *me* has no power to excite them; but certainly seems at least to have that of choosing or refusing, of concealing or repressing them in some degree; and there is in *me* a consciousness at least of their *existence*, as well as of my power to perform the former motions whenever the machine is in a state to act. If any one will still say, that 'the whole is a mechanism, and that matter may think,' it is not in my power to convince him. I allow there is something mechanical, some connection with the body in every operation of the mind; but still there is, besides, a *something* that I must call *me*, which receives the impressions of the senses; which distinguishes pleasure from pain; which chooses the one, and rejects the other; which is *conscious*, in short, of its own existence, and conscious also that it exists not of itself. This, however, though it be, I suppose, in every man, is not attended to by all; nay, probably, would not have been attended to by any, if divine revelation had not taught man to think. The great argument of the materialist is, that he who is supposed to act with freedom of will is supposed to act without a motive; but this I beg leave to deny. There is a motive in every man, viz. the desire of happiness, and consequently of existence. I cannot see any right we have to think that the Almighty cannot give every one power to choose, as to the means of happiness, whether to seek it in present enjoy-

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ments or in future hopes; in living obedience to Divine Wisdom, or in the gratification of gross appetites. In the first kind of motions beforementioned, I see a proof of great goodness in the Supreme Being, in not having left my preservation to myself. In the second, I feel the power, and see the wisdom and goodness of God, in making me sensible of a continual dependence on him; and in performing by me such things as I could not do without a degree of knowledge, and a multiplicity of attentions which would make me a very *different*, and I suppose a less *happy* being than I now am. As to the last (the motions our passions excite), it seems to me evident, that it is more worthy of the Divine Wisdom to be served by moral agents, than by those whom necessity directs; and I therefore believe we have a power to regulate our passions, and check, in some degree, this third kind of motion. I think, then, I see a reason for the three distinct sorts, which every one must be conscious do exist in fact, allowing a freedom of will. But if the whole is guided by necessity, I cannot see any reason for these different appearances, especially for the fallacy which must be naturally imposed upon the greatest part of mankind, and *that* without any advantage to be obtained by it; I mean the idea of being free agents, which seems to force itself upon us. I think there is still another thing worth observing, as to the motions that concern preservation, which is the uneasy sensations that attend the least disorder in that first set of motions. For these sensations seem to call for help: but to whom do they call, if not to that same *me*, i. e. the human *soul?* If any thing happens to the exterior parts of the body, the second sort of motions immediately give relief. The eye-lids shut mechanically; the hand moves to a part that is hurt; the body springs when in danger of falling; but a palpitation of the heart, a pain in the sto-

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much, finds no mechanical relief. It calls upon the understanding and will to provide a remedy, and therefore necessarily points out the existence of such faculties, and a Being in whom they exist; but if no such being does exist, and all is mechanical, how can we account for the Divine Wisdom, in providing two different ways of acting on that same thinking machine, where one would have been sufficient?

SEPT. XI.

Influence of the Moon on the Human Body.

FORMERLY there were imputed to the moon certain influences upon the body, which were only calculated to raise superstition and groundless fears. The gardener would not plant till he had consulted the moon. The ploughman deferred sowing till he was certain of its happy influence. Sick people attended, with superstitious exactness, to the changes of the moon; and the physicians themselves observed it in their prescriptions. By degrees these prejudices have been removed, or are at least less universal than they were.—This is one of the advantages the present age has over the former. It is our duty to make it still more universal, and to endeavour to banish as much as we can the old superstitions. In regard to the influence of the moon on our bodies, the safest way is to preserve a medium: for as it would be irrational to attribute to that planet too great a power over the human body, so it would be no less rash to deny it any effect. It must in reality be allowed, that the moon occasions great changes in the air, and of course may produce some in our bodies. The moon causes such considerable alteration and motion in the higher atmosphere, that earthquakes, winds, heat, cold,

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vapours, and fogs, result from thence; and, in that case, the health of our body will, in a great measure, depend on the influence of the moon. It is observed in persons that have certain infirmities, that they relapse, and suffer more at the time of the new and full moon. This is not surprising; for if it be true that cold, damp, cloudy, and stormy weather has a different effect upon our health from a warm, dry, pure, and serene air, the moon may well have an influence on the animal frame, since it produces so many changes in the temperature of the atmosphere. The power this planet has over the human body, is founded on an undeniable principle, which is, that our health greatly depends on the weather, and the sort of air we breathe; and it is certain that the moon causes many alterations in the atmosphere. Perhaps there may be even a flux and reflux in the human body, occasioned by the moon, like that in the air and sea.

Why do most periodical diseases return at the end of four weeks, rather than at a longer or shorter period, if it is not owing to the effect of the moon upon the human body? In general, it is a principle we ought to admit, to the glory of our Creator, that throughout all natural things there are certain connections, which influence in different ways the animal economy. There are without doubt many wonders in the atmosphere, still remaining unknown to us, which cause many considerable revolutions in nature. Who knows if some of the phenomena of the corporeal world, which we do not think of, or which we attribute to other causes, may not depend on the moon? Perhaps the light it affords us in the night is one of the least of the purposes for which God formed this planet. Perhaps its being so near our earth was to produce certain effects on us, which the other celestial bodies, from their distance, could not do. It is at least certain, that every thing in

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the universe has relation more or less remote from our globe. And this is what renders the world a master-piece of the Divine Wisdom. The beauty of the universe consists in the variety and harmony of the parts which compose it, in the number, nature, and variety of their effects, and in the sum of happiness resulting from all these combinations. How then can the influence of the moon or stars create superstitious fears in our minds? If we believe that it is God who has planned every thing, and who has fixed the connection between all these globes, how can we encourage vain terrors, so contrary to the idea we ought to form of Divine Wisdom? If we are really persuaded that this great Being governs all things with infinite wisdom and goodness, is it not natural to trust in him, and to rest with joy and tranquillity on his good providence?

SEPT. XII.

The Ignis Fatuus.

THE Ignis Fatuus is composed of little light flames, which play in the air, only a few feet from the ground, and appear to go here and there and every where. These fires seem sometimes to disappear and go out all at once, probably when bushes or trees conceal their light, but they kindle again immediately in other places. They are not common in cold countries; and it is said, that in winter they chiefly appear in marshy places. In Spain, Italy, and other hot countries, they are known at all seasons; and neither rain nor wind extinguishes them. They are frequently seen where there are putrid plants, or animal matter, as in church-yards, shores, rich, and marshy ground. There have been too few experiments made on these sorts of etherial fires, to determine precisely

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as to the nature of them. But the places where they are generally seen may give rise to probable conjectures; for as they scarcely ever appear but in marshy countries, it is natural to suppose them sulphureous vapours which take fire. It is known that carcases and rotten plants sometimes cast out light. Perhaps vapours condensed by the cold of the night take the appearance of Ignis Fatuus. Perhaps it may be the effect of a slight electricity, produced by the interior motion of the vapours which rise in the air. Horses, dogs, cats, and even men, may become so electrified as to cast out sparks of fire, when they are rubbed, or otherwise put in motion. May not this be the case with some parts of the earth? It may so happen, that, in some circumstances, a field shall be electrified in some parts of it, and then it is not surprising that it should appear luminous. Even the air may occasion the Ignis Fatuus, when it is electrified to a certain degree. If the manner of their being produced is still doubtful, we are certain, at least, that they proceed from natural causes, and consequently are not obliged to have recourse to superstition. The superstitious people look on these flames with such terror, that few of them have courage to go near them. They think they are the souls of the dead, or wicked spirits walking here and there, who take pleasure in leading travellers astray in the night-time. What may have given rise to this superstitious idea, is the observing that the Ignis Fatuus follows all the ways of the wind, and thus flies from those who pursue it; and, on the contrary, follows those who try to avoid it, and fixes on carriages which go swiftly. But the reason of this phenomenon is very evident: for the person who pursues this flame drives the air, and consequently the fire before him; whereas the person that flies leaves an empty space, which the ambient air fills up continually. This produces a current of air be-

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tween him and the fire, and of course draws it after him. This is the reason we observe it stop when the person ceases to run. How much we torment ourselves by vain terrors, which have no foundation but a disordered fancy. We might spare ourselves many fears, if we would take the trouble to examine the objects which frighten us, and seek for their natural causes. The same thing happens to us in respect to moral things. With what ardour we pursue the goods of fortune, without examining if they are worth such anxiety, or can procure us the hoped-for happiness. Most ambitious and covetous people are as unsuccessful in the pursuit of honours and riches, as Robert Flood was, who ran after the Ignis Fatuus, without being able to catch it. What do we gain in the end by our continual endeavours to obtain blessings, which, in their nature and duration, are like the Ignis Fatuus. Earthly blessings generally escape those that pursue them, and fall to the lot of those who seem to fly from them.

SEPT. XIII.

Of Minerals.

IN order to provide mankind wholesome and convenient dwellings, they require many materials. If these materials had been spread over the surface of the earth, it would have been entirely covered with them, and there would not have been room for the animals and plants. Our earth is happily free from such incumbrance. The ground is left free to be cultivated and enjoyed by its inhabitants, without any hindrance. Metals, stones, and a hundred other things we continually make use of, are shut up in vast magazines under our feet, where we may have them when

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we want them. They are not concealed in the heart of the earth, nor so deep as to render them inaccessible to us, but are purposely brought near the surface, and placed under a vault, which is both thick enough to furnish our food, and thin enough to be dug through when necessary, to take out some of the numberless provisions contained in it for the use of mankind.

Minerals may properly be divided into four classes of very distinct characters. The first includes *fossils*. We give that name to minerals, which cannot be dissolved either in water or oil, and are not malleable, and which bear the fire without losing any substance in it. To this may belong not only the simple earths, but the stones also which are composed of them. There are two sorts of stones, the precious and the common stones. The latter are very numerous, and present us masses different in form, size, colour, and hardness, according to the earth, sulphur, &c. of which they are composed. Precious stones also differ very much. Some are perfectly transparent, and appear to be the most simple. Others are more or less opaque, according as they are composed more or less of heterogeneous particles.—The *salts* form the second class of minerals. It comprehends bodies which water dissolves, and which produce a relish. They are divided into acids, which are sharp and sour, and into alkalies, which leave an acrid, burnt, lixivious taste on the tongue. These have the property of changing into green the blue juice or dyes of vegetables. From the just and exact mixture of these two different salts, tempered by each other, proceeds the neutral or middling salts; such as the common kitchen-salt, which is either taken out of the earth, or prepared with sea-water, or obtained by the evaporation of salt water boiled in great cauldrons. All these salts together are one of the chief causes of the vegetation of plants. They possibly serve

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also to unite and fix them, as well as all the other compound bodies. Lastly, they occasion fermentation, the effects of which are so numerous and so different. The third class of minerals comprehend inflammable bodies, to which are given the name of *bitumens*. They melt in the fire: and when they are pure they dissolve in oil, but never in water. They are distinguished from other minerals by the inflammable substance which they contain more than any other, and which renders combustible the bodies they mix with, if in sufficient quantity. The fourth class of minerals is the *metals*. They are much heavier than the rest. They become fluid in the fire, but they resume their solid state when cold. They are bright, and are capable of being distended under the hammer. There are some metals, which, though melted in the fire, do not diminish in weight, or undergo any other sensible alteration. This gives them the name of *perfect metals*. There are two of this order, viz. gold and silver. The metals called *imperfect*, are reduced more or less quickly by fire, and generally change into a calx. One of these (lead) has the property of changing into glass, and of vitrifying also all the other metals, except gold and silver. There are five of the imperfect metals, quicksilver, lead, copper, iron and pewter. Lastly, there are bodies which differ from these metals by not being malleable. They are called half-metals, and there are seven of them; the platen, bismuth, nickel, arsenic, antimony, zinc, and cobalt.

The mineral kingdom is the great warehouse of Nature, where she secretly labours for the good of the world. No naturalist can surprise her in her operations, and steal from her the art with which she prepares, collects, and composes earths or fossils, salts, bitumens, and metals. If we cannot guess how Nature employs the matter which she every day produces, it is no less difficult to discover how the parts mix, combine, attennate, and,

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in the end, form the different bodies which minerals present to us. We have but an imperfect knowledge of the earth, and we are still less acquainted with the inside of it. The deepest mines are not lower than 630 fathoms, which is not the sixth millionth part of the earth's diameter. This alone may convince us how impossible it is to have an exact and general knowledge of nature. Happily in the use we make of Nature's gifts, it is of little consequence that we should know their origin and first principles. It is enough that we should understand their use. We want no more to prove the glory of the Creator, as we are convinced that there is not a spot, either above or below the earth, in which he has not shown his power, wisdom, and goodness.

SEPT. XIV.

Some of the chief Exotic Plants.

WE do not pay attention enough to the gifts of God, particularly to those which come to us from distant countries, and are now so necessary to us. If we considered how much trouble it costs, and how many wheels in the machine of the world must be put in motion, and how much human industry it requires to procure us a single bit of sugar or cinnamon, we should not receive the presents of Nature so coldly as we generally do; but, on the contrary, we should look up, with the warmest gratitude, towards that beneficent Being, who makes use of so many means of bestowing blessings upon us. Let us at present dwell on some of the foreign productions which are become to us necessaries of life. Perhaps some good reflections may arise from it; and we may think at least with pity on those unhappy slaves whose indefatigable labour supplies us with so many

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luxuries. Sugar, properly speaking, is the salt found in the juice or marrow of a certain reed, which is cultivated chiefly in Brazil and the neighbouring islands; but which also grows in great abundance in the East Indies, and some of the African islands. The preparation of sugar does not require much art, but is extremely laborious; and it is generally the employment of slaves. When the canes are ripe, they cut and carry them to the mill, to bruise and extract the juice from them. They first boil this juice, which would otherwise ferment and grow sour; while it is boiling, they skim it to take off any dirt. They repeat this course four times in different cauldrons. To purify and clarify it the more, they throw it into a strong lye of wood ashes, and burning lime, and at last pour it into moulds, where it coagulates and dries.—Tea is but the leaf of a shrub which grows in Japan, China, and other Asiatic provinces. Three or four times during spring, these leaves are gathered. Those of the first crop are the finest flavoured and the most delicate. This is the imperial tea; but it never comes into Europe. That which the Dutch sell under that name is tea of the second crop.—Coffee is the stone of a fruit like a cherry. The tree which produces it is originally from Arabia; but it has been transplanted into several hot countries. Next to Arabia, it is best cultivated in the isle of Martinico. We call the stone in the middle of the fruit the berry. This berry, when fresh, is yellowish, or grey, or a pale green; and it preserves this colour in some degree when dry. They spread the fruit on mats to dry in the sun; and afterwards bruise it with rollers to force out the berries. This is what divides the berry in two. They again dry them in the sun before they put them on ship-board. The cloves are buds, or dried blossoms of a tree, which formerly grew without culture in the Moluccа islands, but which the

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Dutch have transplanted to Amboyna. This tree is of the size and shape of the bay-tree: its trunk is covered with bark, like that of the olive. White blossoms grow in tufts on the extremity of the branches, and look like a clove. The buds are at first of a pale green; afterwards they become yellow; then red; and at last a dark brown, such as we see them. They have a stronger and more aromatic smell than the mother clove, a name which marks the dry fruit of the tree.—Cinnamon is the second bark of a kind of bay tree, which scarce grows any where at present but in the island of Ceylon. The root of the cinnamon tree divides into several branches. It is covered with a bark, grey without and red within. The leaf would a good deal resemble the laurel, if it was shorter and less pointed. The blossoms are small and white, of a very pleasing smell, very like the lily of the valley. When the tree is some years old, the two barks are taken off. The outer bark is good for nothing, and thrown away. The inner one is dried in the sun, where it rolls up of itself, about the size of a finger; and this is what we call cinnamon.—The nutmeg and mace come from the same tree, and grow in the Molucca islands. The nut is covered with three coats. The first falls off of itself when it is ripe. The second then appears, which is very thin and delicate. It is taken off with great care from the nut, and exposed to the sun to dry. This is called mace in the Molucca isles; though in other places improperly called nutmeg-blossom. The third coat is immediately next the nutmeg. They take the nut out of its shell, and put it into lime-water for some days, and then it is properly prepared to send abroad.—Cotton grows in most of the countries of Asia, Africa, and America. It is inclosed in the fruit of a certain shrub. This fruit is a sort of pod, which, when ripe, opens a little, and shews a wad or flock of down, extremely white, which we call

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cotton. When this pod is swelled by the heat, it becomes as large as an apple. With a little mill they separate the seed from the cotton. The seed falls out on one side, and the cotton on the other. They afterwards spin it for all sorts of work.—Olive-oil is the juice squeezed out of that fruit, which grows so abundantly in France, Spain, Portugal, and Italy, that there are whole forests of olive-trees. The inhabitants of the provinces where there are many of these trees, make use of this oil instead of butter; because they have not much cattle, as the extreme heat dries up the grass.—Pepper is the fruit of a shrub, the stalk of which requires a prop to support it. Its wood is knotty like the vine, which it much resembles. Its leaves, which have a very strong smell, are of an oval form, and terminate in a point. In the middle, and at the ends of the branches, there are white blossoms, from whence spring fruit in clusters, like the gooseberry. Each cluster bears twenty or thirty seeds.

It is no small satisfaction to a reflecting mind, to think of the great variety of provision, intended not only to supply our wants, but our pleasure also. Let us reflect on the profusion of blessings which are granted us by Divine Goodness. Behold how every country contributes to furnish us with the necessaries and the conveniences of life. They labour for us in the most remote countries; and those miserable beings, alas! who deserve as well as we to lead a happy life, and to eat their bread in peace, they by their hard labour prepare for us those delicacies which we so profusely consume. If we do not reflect on our heavenly Benefactor, let us at least think of the instruments he makes use of to procure us our subsistence. But how can we forget God, who every where provides for us, and signalizes his goodness towards us over the whole earth.

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SEPT. XV.

Reflections on Myself.

I AM alive; my blood circulates, without my knowing how, through my veins which are formed for that purpose with wonderful art. I can enjoy the sweets of sleep; and, in that insensible state, even when this body appears motionless and lifeless, my soul still exists. I awake; my senses resume their functions, and my soul receives clearer and more lively impressions. I eat, I drink; and, on all sides surrounded with the beauties and treasures of nature, I experience a thousand pleasing sensations. Am I the cause of these effects? Did I give to the first principles, the first lineaments of my body, this wonderful motion? when I was plunged in nothingness, and knew not what motion was! Did I form the many different parts of my body, I who do not even now know their arrangement and combination? Was I wiser, or had I more knowledge, before I existed, or did my existence proceed from my thinking principle? How is it that I cannot determine the period of sleep and waking? What is the mechanism of my stomach, which digests food without my directing, or in any way contributing towards it? and how is this digestion contrived? why are all creatures of my species formed as I am? and why did I not form myself differently? Did I create all the beauties of nature, or did they also produce themselves? What makes me susceptible of pleasure and grief? What is it that makes the bread to grow in the ground, and the water to spring up, that my body may not wither away, nor my limbs lose their motion? Who sends rays of light to fall upon my eyes, that I may not be enveloped in eternal

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darkness? From whence proceed the blessings I experience, and from whence the pain and grief of which I am sensible? Why do I not enjoy continual health? And why was I so cruel to myself, as to form myself with so many imperfections? Does every thing proceed from me? Have I power and activity enough for that? and are all my fellow-creatures endowed with the same faculties? Extravagant and inconsistent thoughts, which betray the perverseness of those who indulge them. My soul, limited and imperfect as it is, declares the greatness of that Being who formed it: a necessary Being, of infinite perfection, on whom I entirely depend. This body which I bear, and the construction of which I am not myself acquainted with, shews, that it must have a wise Maker, whose greatness my weak understanding cannot fathom; and who has formed and placed so admirably all those muscles, nerves, veins, in a word, all the parts of which I am composed. How could man, who is so weak and limited a being, conceive and execute the original of a machine so composed, and so artfully constructed, the parts of which are connected with such harmony, he who is not able even to copy or make an exact representation of it? There is not the smallest particle of our bodies for which there is not a reason, and which is not either absolutely necessary, or at least made such by the connection with the other parts. Experience, as well as reason, proves this beyond a doubt; and certainly the Creator must be infinitely great, since I am not the only being who may glory in having been formed with so much wisdom, and with such wonderful art. Millions such as me, innumerable multitudes of animate and inanimate creatures, seem to cry out with one voice, Behold the invisible God, acknowledge him in his works; behold his greatness and perfection displayed in all of us. Reflect on the most insig-

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nificant of beings: it lives as thou dost; it has received its existence and life as thou hast done. Blessed be He who has so wonderfully formed us. To Thee, O Lord! Thou adorable Author of my existence, do I owe eternal thanksgiving. It is through Thee that I live, move, and have my being. It is through thy goodness that my soul continues to reflect and think in a sound body. It is to Thee alone I owe all the pleasure I receive from the creatures which surround me. It is by thy will that all nature gladdens my heart. Thou waterest the earth, that it may not be as brass to me, and that I may not perish for want of food. It is Thou whose power, wisdom, and goodness, I and all intellectual beings adore. It is thy Providence I bless. It is to thy paternal care I hereafter recommend myself. Thou knowest all hearts. Thou hast an eye upon us; and Thou regardest all our actions. Thou dost not desire that we should pass our days in darkness and sorrow; or that we should consider our existence as an evil. Thou permittest us to enjoy with a grateful heart the innocent pleasures of life. When the bird, flying in the air fills me with wonder at the rapidity of his flight, and charms me with his elegant form and sweet notes; is it not just that I should recollect he is thy work, and his songs so many hymns to the Creator, which ought to lead me, in my turn, to sing thy praise? Thou providest for him as well as for me. He feeds on the seeds which Thou causest to grow for him, as well as the corn which seems to rot on the ground, and yet, by thy command, becomes the support of my life. Thou sendest sun and rain, to make the earth abound in delicious fruit; while I, with the utmost effort, could not produce a single blade of grass. It is not merely the necessaries of life that Thou grantest us, but also what the world calls riches, pleasures, fortune, &c. Thou directest events in such a manner, that even those which appear the most un-

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fortunate, often contribute towards our happiness. In a word, after having formed us most admirably, Thou still preservest us by a continual train of wonders. May the precious short hours of my pilgrimage on earth, those hours that will never return, may they be employed in a manner worthy the design of my existence; so that, when I quit this world, I may arrive at still greater happiness, and be enabled to understand thy mysteries of nature and of grace. May the contemplation of thy wonders, by the assistance of thy Holy Spirit, lead me to praise Thee, my Creator, Thou Being of beings, for ever and ever!

SEPT. XVI.

The Strength of the Human Body compared to that of Animals.

ALTHOUGH the human body is more delicate externally than that of most animals, yet it is very strong, and perhaps more so, in proportion to its size, than any of theirs. For, when we compare the strength of a lion to that of a man, we ought to consider, that this animal being armed with claws, we are apt to form a false idea of his strength, from the use he makes of them. But there is a better method of comparing the strength of men and animals. This is by the weight they can bear. If it was possible to collect into a single point altogether the whole strength a man makes use of each day, it would be found that one of the least men would be able to lift a weight of 172,000 pounds a foot from the ground, every day, without hurting his health. In general, people accustomed to hard labour can, without much difficulty, carry burdens of 150, and sometimes 200 pounds weight. The street-porters often carry burdens from 700 to 800 pounds weight.

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In London, those who ply at the quay to load and unload ships, sometimes carry burdens which would kill a horse. The size of a man's body is, in proportion to that of a horse, as one to six or seven; therefore, if the horse was proportionably strong, it could bear from 12,000 to 14,000 weight, which it cannot do by any means. A learned Frenchman made an experiment of the strength of the human body. He had a sort of harness made, by means of which he placed on every part of a man's body, standing up, a certain number of weights, so that each part of the body supported as much as it could bear with the others; and there was no part that was not loaded as it ought to be. This machine enabled the man to carry a weight of 2000 pounds, without his being overloaded. We may also judge of the strength of man by the exercise he is able to use for a continuance, and by the lightness of his motions. Men who are used to running get the start of horses, or at least can bear the exercise longer; and, even in walking, a man who has been accustomed to it, will go farther in a day than a horse can; and if he should go no farther, he will be able to continue his journey many days, without inconvenience, while the horse will be exhausted with fatigue in a much less time. At Ispahan the couriers go near thirty German leagues in ten or twelve hours. Travellers assure us that the Hottentots outrun the lions, and that the American savages, who hunt the elk, pursue these animals, though they are as fleet as the stag, with such swiftness, that they tire them down and catch them. Many more things are told of the prodigious lightness with which the savages run, and their long journeys on foot up steep hills, in the roughest ground, where there is no beaten path. These men, we are informed, take journeys of a thousand or twelve hundred leagues in less than six or eight weeks. Is there any ani-

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mals, except birds, with muscles strong enough to bear fatigue so long? The civilised part of mankind do not know their own strength. There are sometimes men of very extraordinary strength amongst us; but this gift of Nature, which would be so valuable, if necessary to be employed in their defence, or in useful labour, is of very little advantage to a polished people, where the mind does more than the body, and where manual labour is left to the lowest order of men.

Here, again, we may observe the admirable wisdom with which God has formed our bodies, and made them capable of such activity. At the same time, I cannot but look with pity on those indolent men who pass their lives in idleness, sloth, and effeminacy, and who cannot resolve to exercise and make use of their strength, for fear of hurting their health, and endangering their lives. Why has God given us such powers, if it is not to make use of them? Therefore, when we waste them in effeminate indolence, we refuse to conform to the will and intentions of our Creator, and are guilty of unpardonable ingratitude. Let us then employ our powers in the service of our fellow-creatures, according to the situation in which God has placed us in the world, and, if circumstances require it, let us eat our bread with the sweat of our brows. Shall we not still be happier than many millions, who are exhausted with pain and labour, groaning under the yoke of insupportable slavery, who, when worn out, have no means of relief, no rest from their oppression. The more happy we find ourselves in comparison with these miserable people, the more attentive we ought to be to fulfil our duties. The success of our labours ought to lead us to bless with gratitude the gracious God who has vouchsafed to grant us strength.

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SEPT. XVII.

The natural Instinct of the Butterfly in the Preservation of its Species.

AT this season of the year the butterflies all disappear; but the race is not extinct. The insect lives in its posterity; and, by a wonderful instinct, has taken care to provide for the preservation of its species. The eggs it has laid will produce new generations: but where will it lodge them at the approach of the winter-season? and how will it guard them from the autumnal showers, and from the cold? Are they not in danger of being washed away, or frozen? The beneficent Being, who gives wisdom to man, has also vouchsafed to inform the butterfly how to secure in safety the only surviving legacy it leaves to the world, by pasting over its eggs with a gluey substance it draws out of its body. This sort of paste is so close and compact, that the rain cannot penetrate through it; nor can the common cold of the winter kill the young ones contained in those eggs. But it is observable, that though each species always follows the same method, from generation to generation, yet there is great variety in the measures which the different species of butterflies take for the preservation of their race.—Naturalists inform us, that some of these insects lay their eggs in the beginning of autumn, and die soon after. The sun, which has still some power, warms the eggs.—There come out (even before winter) a number of little caterpillars, which begin to spin directly, and make themselves very spacious nests of their thread, where they pass the cold season of the year without eating, and almost without motion. When this retreat is opened, it appears that

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what they spin serves them for bed and covering. It is also remarkable, that the butterflies, as well as other insects, constantly lay their eggs on chosen plants fit for their young, such as will afford them the necessary food. Thus, when they are hatched, they find themselves surrounded with proper food, without being obliged to change their place, at a time when they are too weak to go far.

All these things, and many others of the same nature, are calculated to make us admire the wise plans of protecting Providence. If any thing, but miracles absolutely out of the course of nature, could affect and excite our attention, the reflecting on the care which these insects take of their young, cares so varied in the different species, and yet so regularly the same in each particular species, would fill us with the greatest astonishment.—Let us, who are rational beings, learn from these little creatures to maintain in our hearts the love of posterity, and to interest ourselves effectually in those that are to come after us. Let us not be discouraged in the projects and schemes we form, by the thought that death may overtake us before we have accomplished them. Let us remember what we owe to society, and that we ought to take at least as much interest in what relates to posterity as those who came before us did in what relates to this age. It is particularly the duty of parents to learn from the butterfly to provide for the welfare of the children who survive them, and to place them beforehand in as agreeable and good a situation as they can. They certainly cannot foresee, nor consequently prevent, the wants and misfortunes to which they may be exposed by unforeseen accidents; but at least they should not be made unhappy through our fault.

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SEPT. XVIII.

The Vine.

WE need only reflect on the vine, to be convinced how unreasonable those are who complain of the inequalities and unevenness of the ground. The vine never flourishes on a flat, neither does every sort of hill agree with it, but those only which are turned towards the east or south. Hills are in a manner the bulwarks of nature, which she invites us to cultivate as so many vast walls for fruit, where the warm reflection of the sun unites with the fine open air to nourish them. Even the most barren hills, and those hanging grounds, where the plough cannot be used, are every year covered with the most beautiful verdure, and produce the most delicious of all fruit. If the soil where the vine grows appears so poor and bad, the plant which furnishes us with wine is little better. Who would have thought that the worst wood, the most shapeless, brittle, and useless of any, should produce so valuable a liquor? And yet such is the fire with which the vine is animated, that the sap flows through it with five, or even eight times more force, than the blood in the veins of animals.

The evaporation of the vine is also so considerable, that, in order to replace what exhales through the leaves, it is necessary that 152 inches of sap should rise up into the vine in the space of twelve hours. Who is it that gave to the vine qualities so superior to the meanness of its origin, and to the poverty of its native ground? Who gave it such fire and spirit, that it may be preserved for several years, and even grow the stronger? With what wisdom also has God disposed the vineyards over the earth? They do not thrive every where.

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They require to be situated between 40 and 50 degrees of latitude, consequently in the middle of the globe. Asia is originally the country of the vine. From thence its cultivation has gradually extended into Europe. The Phenicians, who travelled in early days over all the Mediterranean coasts, conveyed it to several islands, and to the continent. It succeeded wonderfully in the islands of the Archipelago, and was afterwards carried into Italy. The vines multiplied greatly there; and the Gauls having tasted the juice, and wishing to settle in the places where the vines grew, passed the Alps, and went to conquer both the borders of the Po. By degrees vines were cultivated all over France, and at last on the borders of the Rhine, the Moselle, Neckar, and other provinces of Germany.

These observations may give rise to many important reflections. As the most barren soil is fit for the culture of vines, so it often happens that the poorest countries are favourable to science and wisdom. We have known, in provinces universally despised for their poverty, geniuses rise up; who have, by their knowledge, enlightened other kingdoms. There is no country so desert, no town so small, nor village however poor, in which certain branches of learning have not been cultivated with success. And how great an advantage would it be to us, if we were to promote as much as possible the culture of the human heart? Sovereigns, ministers, instructors of youth, how much might you contribute to the happiness of your fellow-creatures, and posterity also, were you, by exhortation, rewards, useful establishments, and other such encouragements, to endeavour to bring back wisdom, religion, and social virtues, into the ruined towns and miserable villages! Such endeavours are scarcely ever entirely useless. We are rewarded for it, or at least our descendants reap the fruits of it; and we should be numbered

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among those respectable men, who, by becoming the benefactors of mankind, secure to themselves the approbation of God, and the blessings of their fellow-creatures.

The vine, with its dry and shapeless wood, is an emblem of those who, devoid of the outward splendour of birth and honours, fail not to be very useful. How often does it happen that men who live in obscurity, and whose appearance promises nothing, are, however, capable of actions, and perform enterprises, which raise them above all the great people on earth.

Let us here reflect on Christ himself. To judge of him by the low condition in which he appeared, who could have expected from him such great works, so wonderful, so salutary to mankind? He has, however, performed them. This Christ, who, like the vine, was planted in a barren soil, has borne fruit, which is a blessing and salvation to the whole earth. He has also proved to us, that one who is poor, despised, and miserable in this world, may, however, labour successfully for the glory of God, and the good of mankind.

SEPT. XIX.

Daily Wonders performed by God.

THE whole universe, which still subsists in all its beauty, and in its original order once established, is a miracle we have constantly before us. What a world, in reality, is this which we inhabit! How great the number, the variety, the beauty of the creatures it contains! What hand, but that of the Most High, could place in the immense expanse of the heavens, the sun, and all those stars, whose size and prodigious distance from us confound our imagination? Who could determine the course they were to run for so many thou-

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sands of years that are passed? Who calculated so exactly the respective force of all these globes? and who established so perfect a balance between them and the air which supports them? Who placed this earth at so proper a distance from the sun? The vicissitudes of day and night, the revolutions of the seasons, the innumerable multitude of animals, reptiles, trees, plants, and all that the earth produces, are the works of the Lord. If such a wonderful world was created before our eyes, who would not consider it as one of the greatest miracles of the Almighty power? The particular providence of God is a constant proof of his greatness, his power, wisdom, and omnipresence. The continual care God takes of us, and the marked protection, of which there is nobody who has not had particular proofs; the different means he makes use of to lead mankind to their duty: the paths by which he conducts them to happiness; the adversity he makes use of to awaken and force them to self-recollection; the extraordinary events which he turns to the advantage of his purposes, events which generally are produced by small causes, and other circumstances, which appear to render them impossible; the great revolutions he performs, to spread the knowledge of his gospel from one end of the world to the other;—these are all so many effects, wherein we ought to acknowledge the hand of God continually acting for us; and if we properly attended to them, they would excite us to declare, "This is the Lord's doing, it is marvellous in our eyes." Let us be attentive to all before us, and we shall every where trace God. We shall find, that by ordinary means he still acts for our good; and that we may continually hear his salutary voice. Men who see that God created this world, which on all sides shews them such wonders,—men who are every hour loaded with his blessings, and indebted to him for all that

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they enjoy,—ought they not to believe him, to love and obey him? And yet they refuse to do so. What then can affect them? What is there they would not refuse? We are every day witnesses of the wonders of God. Let us not shut our hearts against the truth. Let not prejudice or passion prevent us from reflecting on the admirable works of the Lord. Let us look into ourselves, and we shall find continual subjects for acknowledgment to him who performs these daily miracles. Full of these great ideas, struck with astonishment and admiration, we shall then cry out, Praise, honour, and glory be to God, who alone does marvellous things; to the God of all consolation, to him be glory for ever and ever!

SEPT. XX.

The Digestion of Food.

THE digestion is a wonderful and very complicated piece of mechanism, which we perform every day, without knowing how, and without even taking the trouble to learn to know what is most remarkable and essential in so important an operation of the human body. Millions of men take their food every day, and perhaps without ever having once in their lives considered what was to become of the food they swallow. It is happy for us, that, in order to digest well, it is not necessary to know how it is performed; but it is still desirable to be informed, so as to have some idea at least, of the operations of nature in this respect. We work the food, so that, after having been ground, attenuated, and moistened, it is in a proper state to be sent from the mouth into the œsophagus. This is the last office, in regard to digestion, in which our will has any part. As soon as a bit is put into the œsophagus, it

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pushes it by a mechanism peculiar to it, and conveys it into the stomach, where its own weight would not otherwise carry it. When in the stomach, the food is there reduced, by some particular means, into a soft paste of a greyish colour, which, after being sufficiently attenuated, passes into the first gut, called the Duodenum. There the mass of food undergoes new changes. Several little vessels which come from the gall-vesicle, and from a gland placed behind the bottom of the stomach, which is called the Pancreas, terminate at the duodenum, and pour into it the bile and pancreatic juice, which mix with the food. There are, besides, in the guts, a number of glands or kernels, which disperse their humours into the paste, and penetrate through it. It is after this mixture that a real chyle is discovered amongst this mass; and there is much reason to believe that the digestion is finished and completed in the duodenum. The mass of food continues its way through the other guts, where it is constantly kept moist by the juices which separate into their cavities. The chyle begins then to pass into the lacteal veins, which open on every side into the guts, and afterwards terminate in the reservoir of the chyle. This is placed in that part of the back where begins the first chine-bone of the loins, and there springs from it the thoracic artery, which runs up all along the chest. The chyle flows through this artery, and mixing afterwards with the blood, goes into the heart, and from thence through all the veins of the body, after having lost its whitish or greyish colour.

This is a slight sketch of the manner in which the digestion is performed within us; a point so essential to our health, and even to our existence. Let us reflect how evidently the wisdom of God appears in all this. How many wonderful circumstances must unite for this operation. It requires

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that the stomach must not only have an inward heat, and dissolving juices in it, but also a peristaltic motion, in order to reduce the food into a soft paste, and change it afterwards into chyle, which disperses through all the limbs of the body, and supplies them with blood and nourishment. A liquor called saliva is necessary, which has the properties of soap, and the virtue of mixing together oily and watery substances. It is necessary that, through the whole course which the food takes, there should be certain machines, to separate from the blood many humours which are required for the perfect elaboration of it, and to complete the chyle: it is necessary that the tongue, the muscles of the cheeks, the teeth, and some other organs, should divide, grind, and attennate the food, before it descends into the stomach.—What infinite wisdom does all this prove! How unpardonable, were we not prompted by it to glorify our Creator!

SEPT. XXI.

The Blessings of this Life greater than the Evils of it.

NOTHING is more calculated to comfort us in disappointment and distresses, than the admitting it as a principle, that there is more good than evil in the world. Let us in reality consult the most wretched of men, and ask if he can mention as many causes for complaint as he has motives for gratitude. It will appear, that however great his misfortunes may be, they are not equal to the multitude of blessings he has received in the course of his life. To prove this truth more clearly, let us reckon the days we have passed in health, and the small number in which we have been sick, to the few vexations and sorrows we expe-

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rience in domestic and civil society: let us oppose the many pleasures they afford us; let us compare all the good and innocent actions, by which the greater part of mankind make themselves useful, either to themselves or others, to the few hurtful actions they are guilty of; let us count, if we can, all the pleasing sensations which each sense affords us, and all the pleasures belonging to every age, condition, and profession; let us count the gifts which Nature bestows in such abundance, and which human industry makes use of, to furnish us with an infinity of pleasures and conveniencies; let us reckon the satisfaction we felt when we escaped any danger, or gained any victory over ourselves, or had done any virtuous or sensible action; let us reckon all the blessings we remember to have enjoyed, and consider, at the same time, that we can recollect but the smallest part of them; let us be convinced, that it is our being accustomed to blessings that makes us so sensible of evils, that new prosperity makes us forget the former, and that, if the impressions of our misfortunes are so deeply engraved in our memories, it is precisely because they seldom afflict us; let us compare the happy events we remember, though but the smallest part of what we have enjoyed, to the evils, the use of which we are not yet acquainted with. I do not speak of all the evils we may remember; for I do not mean those which lead to good, and have been the source of many great advantages. I do not speak of those evils which, being preservatives from greater, are dispensed to mankind, to make them better and more happy, or to instruct others by their example. These sorts of evils are compensated by their beneficent effects. In the calculation I wish to make, we must only oppose to the blessings we recollect, the evils which we do not yet know the use of; and I say, that if we make this computation in calm and cool moments,

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and not in the time of affliction, vexation, anxiety, or sickness, we shall be convinced that the good predominates greatly over the evils of this world. Wherefore, then, does man think so little of the continual proofs he receives of God's goodness? Why does he love to see the gloomy side of things, and torment himself with unseasonable cares and anxieties? Does not the Divine Providence surround us with pleasing objects? Why then dwell always on our infirmities, on what we have not, and on the misfortunes which may happen to us? Why magnify them in our fancy, and perversely turn our eyes from all that might make us easy and cheerful? But we are formed thus. The least distress fixes our whole attention, while a long train of happy hours passes away unobserved. Let us banish opinions that must render us miserable. Let us be fully convinced that God has bestowed his blessings impartially throughout the world; and that no man has a right to complain; but, on the contrary, a thousand just reasons to sing praises and thanksgivings. Blessed, therefore, be the Lord, who fills our hearts with joy and gladness. If he sometimes tries us with affliction, his consolations soon pour balm into our souls. In his goodness he vouchsafes to promise us happiness, eternal and unclouded. He leads us, by secret and unknown paths, to the lot he designs us. Even the trials he now and then sends us have most merciful views, which we shall one day acknowledge. In the mean time, he spares us evils beyond our strength. His almighty and paternal hand protects us, and his eyes are ever upon us.

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SEPT. XXII.

The Enmity between Animals.

THERE is a constant war among animals. Every element is to them a field of battle. The eagle is a terror to the inhabitants of the air. The tyger lives by slaughter upon the earth, the pike in the water, and the mole under ground. In these animals, and many others, it is the want of food which forces them to destroy one another: but there is an antipathy between some creatures, which does not proceed from the same cause. It is, for example, very evident that the animals which twist themselves round the trunk of the elephant, pressing it till the elephant is stifled, do it not with a design of procuring food. When the ermine jumps up, and fixes itself in the ear of the bear or the elk, and bites them with its sharp teeth, we cannot say that these hostilities are occasioned by hunger. Besides this, there is not an animal on earth, however small, that does not serve as food for others. I know very well that, to some, this plan of nature appears cruel and wrong. But I will venture to maintain, that this very antipathy among animals, is an excellent proof that all is for the best. Take them in the whole, and it is certainly an advantage that some should subsist on others. For, on one hand, were it otherwise, a great number of species of them could not exist; and, on the other hand, it makes those useful, instead of hurtful. Insects, and many reptiles, feed on carrion. Others fix in the bodies of certain animals, and live on their blood and flesh; and those same insects serve as food to others. Carnivorous animals, and birds of prey, kill creatures to feed upon them. There are some species which multiply so very fast, that they would be a burden to us, were there not a

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stop put to such increase. If there were no sparrows to destroy insects, what would become of the fruit and flowers? Were it not for the ichneumon, which, as they say, seeks the eggs of the crocodile, to destroy and break them, this terrible animal would multiply to a frightful degree. Great part of the earth would be a desert, and many sorts of creatures would never exist, were there no carnivorous animals. It may, perhaps, be said, that they might live on vegetables, but if so, our fields would scarce be enough to feed the sparrows and swallows. It would also be necessary to change the construction of the carnivorous animal body for that purpose; and how could fish subsist, were they not to feed on the watery inhabitants? There is reason also to suppose, that animals would lose much of their vigour and life, were it not for the continual wars amongst them. The creation would be less animated, the beasts would grow dull, and even mankind would lose much of their activity. Let us add to this, that many striking proofs of the wisdom of God would be wanting, if there was a constant peace amongst animals; for the address, sagacity, and wonderful instinct, with which they lay snares for, and surprise their prey, discover to us very evidently the wisdom of the Creator. So far, then, is the enmity amongst animals from casting a shade over the wisdom and goodness of God, that these perfections, on the contrary, shine with double lustre from thence. It is consistent with the plan of the world, that one animal should persecute another. I confess that we might complain, if it occasioned the entire destruction of any one species: but this is what never happens; and the constant war amongst them is, on the contrary, what preserves the equal balance. Therefore, the carnivorous animals are indispensable links in the chain of beings: but, for this same reason, their number is small in comparison of useful animals.

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It is also remarkable, that the strongest and the most noxious of them have generally the least skill or cunning. They mutually destroy one another, or their little ones become a prey to others. For this reason Nature has endowed the weakest animals with so much industry, and so many ways of defending themselves. They have instinct, keen senses, swiftness, address, and cunning, to counterbalance the strength of their enemies. Who is there that will not observe in all this the infinite wisdom of the Creator, and acknowledge that the state of war, which at first sight appears so strange in nature, is in fact a real good? We should be still more convinced of it, if we were better acquainted with the whole system, the connection and relation between each creature. But this is a knowledge reserved for a future state, where the divine perfections will be more clearly explained to us. Even in this world, however, we may in some measure comprehend why the hostilities between animals are necessary. But one thing is absolutely incomprehensible, why, among nobler creatures, among mankind, we should behold continual division, and destructive wars. Alas! it must be confessed, to the shame of humanity and Christianity, that there are also among men fierce and cruel destroyers; with this difference, that their hostilities are more frequent, and that they often make use of more dark and secret means to hurt one another. Nothing is more contrary to our destination than such conduct. The intention of God is, that every man should make himself useful to his fellow-creatures, and, as much as possible, render their lives agreeable and happy; in a word, to do them all the good offices in his power. Let us not oppose his merciful views, but endeavour to live in peace and harmony. Let animals, void of reason, persecute, hate, and destroy one another, but let us follow

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the example of our Saviour, in loving and endeavouring to make each other happy.

SEPT. XXIII.

The Moral Use of the Nights.

THE days begin to shorten, and the nights grow long. Many people are discontented with this part of Nature's plan. They secretly wish, perhaps, that there was no night, or, at least, that they were all the year round as short as in the months of June and July. But such wishes are unreasonable, and betray our ignorance. If we would take the trouble to reflect on the advantages resulting from the vicissitudes of day and night, we should not be so hasty in our judgments; we should not make such groundless complaints; but rather acknowledge the use of the night, and bless God for it. One circumstance alone should make us feel the moral advantages of the night, as it interrupts the course of most vices, or, at least, of those most fatal to society. Darkness obliges the wicked man to take some rest, and it gives some hours relief to oppressed virtue. The unjust and fraudulent tradesman ceases, in the night-time, to deceive and cheat his neighbour; and darkness puts a stop to a thousand disorders. If men could be awake twice as long as they are at present, to what a degree would wickedness increase! In yielding to vice without interruption, they would acquire a horrid familiarity with sin. In a word, we may allow that the longer the nights are, the fewer the crimes committed in the space of twenty-four hours; and this is undoubtedly not the least advantage we gain from the night. How many mental pleasures, and how much information, would we not be deprived of, if there were no

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night? The wonders of the creation, which the starry sky presents to us, would be lost. Each night we may in them behold the greatness of God. If every thing which reminds us of God is desirable, how must we love the night, which proclaims so forcibly his perfections? If we made this use of it, no night would appear long; none that might not be beneficial to us. One single night's reflection on the works of God would have a salutary effect on our whole lives. Let us contemplate with attention the immense display of his wonders. One single good thought which this may create, a thought with which we may fall asleep, and recollect when we awaken, and which will leave an impression all the day, may be of the greatest use to our hearts and minds. In general, the night is a happy time for those who love to meditate and reflect. The hurry and dissipation in which we usually pass the day, leaves us but little time to recollect ourselves, to wean ourselves from the world, or to think seriously of our duties: but the tranquillity of the night invites us to these useful employments, and makes them easy to us. We may then, without interruption, commune with our hearts, and acquire the most important knowledge, the knowledge of ourselves. The soul may collect its forces, and direct them towards objects which concern our everlasting happiness. We may then banish the ill impressions received in the world, and strengthen our minds against the seducing examples of the age. It is the moment for reflecting on death, and its great consequences. The tranquil solitude of the closet is favourable to religious thoughts, and inspires us more and more with a desire to indulge them.

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SEPT. XXIV.

On our Indifference to the Works of Nature.

WHAT is the reason of our indifference and coldness in relation to the works of God in nature? An answer to this question may give rise to many important reflections. One of the causes of this indifference is *inattention*. We are so used to the beauties of nature, that we neglect to admire the wisdom of him whose impression they bear, and are not as grateful as we ought to be for the numberless advantages which result from them. There are but too many people as insensible as the beasts which graze in the field, and drink of the stream, without reflecting from whence proceed the blessings they enjoy, and without acknowledging the goodness and wisdom of him who bestows them. Thus men, though endowed with the most excellent faculties which enable them to enjoy a greater share of Nature's blessings, scarce ever think of the source from whence they flow. Even when God's goodness and wisdom are the most evidently visible, they are insensible to it, because they are used to it. This, which ought the more to raise their admiration and gratitude, renders them indifferent. Many are cold, in regard to the scenes of nature, from ignorance. How many are there who are unacquainted with the most common objects! They every day behold the sun rise and set. Their meadows are moistened sometimes with rain or dew, and sometimes with snow. The most wonderful revolutions happen before their eyes every spring, but they do not take the trouble to enquire into the causes and purposes of these several phenomena; and, in that respect, live in the most profound ignorance. It is true, that there always must

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be a thousand things incomprehensible to us, were we to study ever so much; and we are never more sensible of our limited understandings, than when we undertake to search into the operations of nature. But we may at least acquire an historical knowledge of it; and the lowest ploughman may comprehend how it happens, that the seed he sows in the ground shoots and springs up, if he will take the trouble to inform himself of it. Others disdain Nature's works, because they are full only of their private interest. I am convinced there would be more attentive observers of nature, if, for example, the spider spun threads of gold, if the lobsters contained pearls, or if the flowers of the field could make old people young. We generally value things according to our interest or fancy. Our self-love is so unreasonable, and we know so little our real interest, that we despise what is most useful to us. Corn, for instance, is most indispensably necessary to our subsistence, and yet we behold entire fields covered with this useful production of nature, without attending to it. Many neglect the contemplation of nature through indolence. They love ease and sleep too well, to take hours from them in order to contemplate the starry sky. They cannot resolve to rise early enough to behold the sun rise. They would dread the fatigue of stooping towards the ground, to observe what admirable art there appears in the formation of the grass. And yet these people, so fond of their ease, are full of zeal and activity, when the indulgence of their passions is the object. It would be a sort of martyrdom to the intemperate man, or to the gamester, to be obliged to devote to the contemplation of a beautiful starry sky, the hours he used to pass in gaming and drinking. A man who loves walking, and who would go many miles on foot to see a friend, would be out of humour if desired to go two miles to observe a natural curiosity. A num-

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ber of people despise the works of nature from irreligion. They have no taste for piety, or the obligations it prescribes. To praise God, to love him, and to acknowledge his blessings, are disagreeable duties to them. We have but too much reason to believe, that this is one of the principal causes of the indifference of mankind to the beauties of nature. If they valued the knowledge of God above all other things, they would eagerly and willingly seize every opportunity of improving and increasing that knowledge. Two-thirds, probably, of the world, may be ranked amongt those I have mentioned. It is certain, at least, that very few study properly, or take a pleasure in the works of God. This is a sad truth, of which we have daily proofs. Would to God we could feel how ill it becomes mankind to be so insensible to the works of the Creator, and how it degrades us below the very brutes. Have we eyes, and shall we not contemplate the wonders which surround us on every side! Have we ears, and shall we not listen to the hymns which every part of the creation chants to the praise of the Creator.

SEPT. XXV.

Upon several Nocturnal Meteors.

IN weather nearly serene, we often observe a circular light, or great luminous ring, round the moon, which we call halo, or crown. Its outline has sometimes the faint colours of the rainbow in it. The moon is in the middle of this ring, and the intermediate space is generally darker than the rest of the sky. When the moon is full, and much above the horizon, the ring appears more luminous. It is often of a considerable size. It must not be imagined that this sort of crown

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is really round the moon. We must seek the cause of it in our atmosphere, where the vapours occasion a refraction of the rays of light, which penetrate through them, and produce this effect. There appear, sometimes round, or on one side of the real moon, some false ones, which we call mock-moons. These are apparently of the same size of the moon, but their light is paler. They are scarce ever without circles, some of which are coloured like the rainbow, whilst others are white, and several of them have long and luminous tails. These also are but illusions produced by refraction. The light of the moon, falling on watery, and often on frozen vapours, refracts in different ways, and separates into coloured rays, which, reaching our eyes, doubles the image of the moon. Sometimes, though very seldom, we see by moon-light, after a heavy rain, a lunar rainbow, with the same colours as that of the solar, except that they are more faint. This meteor is also occasioned by refraction. When sulphureous and other vapours take fire in the higher atmosphere, we often observe streaks of light dart swiftly like rockets. When these vapours collect into a heap, take fire, and fall down, we think we see little balls of fire fall from the sky; and as, at that distance, they appear as large as a star, they are, for this reason, called falling stars. The common people fancy they are real stars changing their place. Sometimes these imaginary stars are seen very brilliant, and beautifully coloured, slowly descending, and still acquiring new lustre, till at last they are extinguished among the vapours of the lower atmosphere, and fall on the ground, where it is said they leave a slimy gluey matter behind them. Great balls of fire have also been seen more luminous than the full moon, with tails sometimes trailing after them. They are probably sulphureous and nitrous vapours, which accumulate

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and take fire; for they generally traverse the air with great rapidity, and burst at last with a great noise. Sometimes, when the inflammable particles are of a very different nature, they disperse without noise, in the upper regions of the atmosphere. The little flashes seen in the summer so often after great heats, are produced by the vapours in the atmosphere, which are less visible because they are higher up. This meteor is distinguished from real lightning by its never being accompanied by thunder. These flashes, properly speaking, are reverberations of lightning, which is at too great a distance for us to hear the clap of thunder attending it. For a flash, at the height of a quarter of a German league, may be seen at the distance of twenty-two leagues and a half: and the reverberation still farther; whereas we can scarce hear the thunder at two or three leagues distance. The flying dragon, the dancing goat, and the burning beam, with many other meteors, owe their odd names to their singular appearance. They are nothing but gross and slimy vapours, which ferment in the wet regions of the lower air; and which, being pressed in different directions by the agitated atmosphere, take those various forms to which people give extraordinary names. Several naturalists have produced some of these phenomena in miniature, by mixing certain substances together. Of all the nocturnal appearances, none is more remarkable and splendid than the Aurora Borealis. It is generally observed from the beginning of autumn till spring, when the weather is calm and serene, and when the moon does not give much light. The Aurora Borealis is not always the same. It is usually towards midnight that a light like the dawn of day appears. Sometimes we observe streaks of light, white and luminous clouds, in a continual motion. But when the Aurora Borealis is to rise in all its perfection, we generally see, if the

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weather be calm and clear towards the north, a dark space, a black and thick cloud, the upper part of which is edged with a white luminous border, from whence dart rays, brilliant sparks, and resplendent pillars; which, as they rise, every moment grow yellow and red; afterwards meet, unite, and form luminous thick clouds: which terminate at last in pillars of all colours, white, blue, orange, or the finest purple, from whence continual rays of light dart out; and it is then that this object is in its full splendour and beauty.

How great is God's magnificence! even the night proclaims his majesty. How can we complain of the length of them at this season, when they present us scenes so magnificent, and so interesting to the mind. The meteors just mentioned render the long nights of the northern nations not only supportable, but even light and agreeable. When we behold these magnificent scenes, let us silently adore our Creator. The morn declares his majesty; the host of stars, and the mild light of the Borealis, display his greatness.

SEPT. XXVI.

Nature displayed.

HAPPY the man whose genius, rising above the mere gratification of his senses, prompts him to enquire, with the assistance of reason, into the true causes of things, and to pierce through the dark veils which conceal from mortals the mysteries of nature! How insensible are mankind! They stop to observe the course of a river. Supinely lying on the green turf, under a shady tree, they behold the clear stream murmuring as it flows: the coolness of the water, the enamelled field, the verdure of its banks, every thing en-

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chants their sight: but few know how to enjoy a still greater pleasure, to trace the source itself of these waters, the inexhaustible reservoir from whence they proceed. Thus, we generally look only on the outside of every thing. Our senses are charmed, without exciting our curiosity. Content with admiring the beauty of objects, we scarce skim the surface. Let us go deeper; let us dare to open a path to the recesses of nature. How noble is it to reflect on the principles of things, to contemplate their essence! It is to this that the wise man soars; all the rest is but the trifling amusement of the vulgar. It would be totally impossible to reckon all the blessings of nature bestowed upon us; but let us endeavour to comprehend, in some degree, how much we owe to our sovereign Benefactor. For this purpose let us look into the places of our several enjoyments, and first into our houses, and see what productions of the earth are there presented to us. The flowers, which appear but a mere amusement, are lovely ornaments to our retreats, and by the sweets they exhale, and their beautiful colours, charm and delight us. The orchards and kitchen gardens are not so pleasing to the eye, but they compensate by their utility; and they produce successions of excellent provisions for our tables during the whole year, a thousand times more wholesome than those invented by art to excite (more properly speaking, to corrupt) our taste. Let us go a little farther; let us quit the confinement of towns and villages, to enjoy the spacious fields where the industry of man can produce that staff of life, that bread, which supports the whole human species. The earth faithfully rewards the farmer's labour, and returns with incredible usury all that is laid out upon it. Unimpaired by age, it constantly resumes the charms of spring; and, after having produced the most plentiful harvest, a winter's rest entirely repairs its losses. Near those fields we may see

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here and there barren hills, hanging grounds, where the plough cannot be used, and from which one might suppose nothing could be expected; but, behold! this poor soil becomes green, there grow upon it paltry-looking trees, the most shapeless and unfit for use of any; but the sand that nourishes them, moistened with a little dew, will soon force them to produce innumerable clusters of grapes, filled with a rich juice, which affords a liquor extremely delicate, and at the same time so strong, that it preserves its perfection for many years; and bears long sea-voyages, or the roughest conveyance to countries where nature has not supplied them with vines. Let us now enter into the woods. The light of day, obscured by the thick foliage of the stately trees, the pleasing coolness, the still silence that reigns through all, combine to give them a striking air of majesty and greatness. What human industry would be sufficient to plant, to water, and to take care of those trees, so indispensible to us; for without them, where should we find fuel to prepare our food, and to protect us from perishing with cold? —God alone creates and preserves those forests, which are, in so many ways, of inestimable value to us. Let us now glance over our meadows and pastures. It is there that Nature has shewn most complaisance to man, and where the beautiful and the useful is most blended. We behold them enamelled with flowers, and full of all sorts of herbs, which not only serve as pasture for animals, but many of them are delightful to us, and furnish us with excellent medicines. The chief use, however, of meadows and fields, is to feed those animals most essential to us. How beautiful an object, how great an ornament to nature is a river! Whether we stop to reflect upon its motion, or the use it is of to us, or whether we wish to trace its origin, the beauty of its course charms us, the multitude of blessings it affords fills us with gra-

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titude, and the obscurity of its source raises our admiration. It is at first but a little stream trickling down a hill, and which the smallest pebble is enough to divert from its course: but soon the overflowing of lakes, the melting of snow, the falling of floods, enlarge it. It makes itself a bed, and flows copiously into it; it enriches the fisherman's hut, and the labourer's dwelling; and, after having been the ornament and delight of the country, it flows with majesty towards the cities, where it conveys plenty by means of the ships it bears. "The river of God is full of water;" thousands of springs burst from the bottom of the earth, and the vast ocean embracing it, absorbs the whole. Lastly, even without mentioning the inside of our globe, where, as in a vast magazine, we find laid up for our different occasions, oily juices, fruitful salts of various sorts, quarries, mines, stones, metals, &c.: Lastly, I say, that the very air which we breathe is full of blessings.—The clouds which collect there pour upon us that fruitful rain, which "watereth our furrows, and maketh them soft, and which causeth the land to flow with milk and honey." The same air, besides giving free passage to those winds which sweep away contagion, transmits also this beneficial light, these salubrious rays, which illumine, warm, and quicken all nature.

Here let us pause, and adore that beneficent, that almighty Hand, that only inexhaustible source, that ocean, from whence flow all our blessings! Let us endeavour to deserve those that are eternal, which as much surpass the present, as the heavens are beyond the earth, eternity beyond time, the Creator beyond the creature.

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SEPT. XXVII.

Amphibious Animals.

BESIDES four-footed beasts, birds, and fish, there is s sort of animal which lives either in or out of water, and is on that account called amphibious. They are all cold, something melancholy and forbidding in their look and form; dull, and ugly in colour, of a nasty smell, and a hoarse voice. Several of them are venomous. Instead of bones, they have only gristles. Their skin is sometimes smooth, sometimes scaly. Most of them hide and live in dirty infected places. Some are viviparous, others oviparous. The latter do not hatch their eggs themselves, but leave them to the heat of the air or water, or lay them in dung. Almost all of them live by prey, which they obtain by cunning or strength. They can in general support hunger a long time, and live a hard life. Some of them walk, and others trawl; which forms them into two classes. To the former those with feet belong. The tortoises, which are of that class, are covered with a strong shell like a shield. The land-tortoise is the smallest. Some sea-tortoises are five yards long, and weigh from eight to nine hundred pounds. There are different sorts of lizards; some smooth, others scaly; some with wings, and some without. Those with wings are called dragons. Amongst these without any, we reckon the crocodile; the cameleon, which can live six months without food; the salamander, which has the property of being some time in the fire without consuming, because the cold ropy slime it emits puts out the coal. Of all animals, the crocodile is the most dreadful. This amphibious creature, which comes out of an egg not larger than the egg of a goose, grows to such a

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monstrous size, that it is sometimes from twenty to thirty feet long. It is voracious, cunning, and cruel. Serpents form the second class of amphibious creatures. They have no feet, but crawl, with a sort of winding vermicular motion, by means of scales and rings with which their bodies are covered. Their back-bones are constructed in a particular manner favourable to this motion. Many of these serpents have the property of attracting birds or small animals to prey upon. Seized with terror at the sight of the serpent, and perhaps stunned with its venomous exhalations and stench, the birds have not the power to fly, and they fall into the open throat of their enemy. As the serpents can stretch their jaws considerably, they sometimes swallow animals thicker than their own heads. Many serpents have in their mouths fangs very like their other teeth. These are a sort of darts they let out and in as they please; and it is by this means that they slip poison into the wounds they make, which comes out of a bag placed at the root of the teeth. This poison has the singular property of only being hurtful in the wounds, while it may be taken inwardly without danger. The serpents provided with the arms just mentioned, make but a tenth part of the whole species; all the others are not venomous, though they attack men and animals with as much fury as if they could hurt them. The rattlesnake is the most dangerous of any. It is generally three or four feet long, and as thick as the thigh of a full grown man. Its smell is strong and offensive. It seems as if nature had given this, as well as the rattle, to this creature, in order to warn mankind of its approach. It is never more furious and dreadful than when it rains, or when hunger torments it. It never bites till it rolls itself up round; but the quickness with which it does this is almost incredible. To roll itself up, to

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rest upon its tail, to dart upon its prey, to give the wound, and to retire again, is to the serpent the affair of a moment. Some of my readers may possibly say, Why then has God produced such and such things which appear hurtful to us? To the well disposed, therefore, who seek for information, I address myself. Perhaps it appears to you that lizards and serpents could not be created for the general good of mankind. But this judgment is hasty: for though a few of them do harm, it is certain that most of them are harmless. There is not a tenth part of the serpents which are venemous; and those are so formed, that it is easy to escape and guard against their attacks. For example, dreadful as the rattlesnake is, it cannot conceal its approach. It it also remarkable, that Providence has opposed to this animal an enemy which can conquer it. The seahog every where seeks the rattlesnake to devour it, and a child is strong enough to kill the most terrible of these reptiles. A very slight blow with a stick upon its back, kills it instantly, or at least in a quarter of an hour. How unjust, also, would it be to consider nothing but the mischief these do us, without reflecting on the advantages resulting from them? Some serve for food; others supply us with medicine, and the tortoise for its shell, is of very great use. In a word, the wisdom and goodness of God appear in this, as in every thing else. To reflect on his perfections, to admire and adore them, such is our duty on beholding those creatures which appear to us to be hurtful. But it can never become us to condemn or murmur at his plans. It would be so much the more unpardonable, as our understandings are much too limited to be able to discover always the use for which these creatures are designed.

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SEPT. XXVIII.

The Perfection of God's Works.

WHAT can equal the perfection of God's works? or who can describe the almighty power visible throughout them? It is not only the greatness, multitude, and variety of them which we admire, but that each particular work is done with such infinite art, each so perfect in their kind, and the most minute production so exact and regular, as to proclaim the greatness and unlimited knowledge of their Author. We are, with reason, astonished at the different arts lately invented, by means of which things are done that would have appeared supernatural to our ancestors. We measure the heighth, the breadth, the depth of bodies; we know the course of the stars; we direct the course of rivers; we can raise or compress waters; we build habitations to float upon the seas; and we accomplish many other works which do honour to the human understanding. But what are all the inventions of men, what are their most magnificent, their most beautiful undertakings, in comparison of the least of God's works? How faint, how imperfect the imitation! How much beneath the original is the copy! Let the very best artist endeavour, with all his powers, to give to his work a pleasing useful form, finish and polish it with all imaginable care, and, after all his trouble, all his industry and endeavours, let him look at this masterpiece through a microscope, and see how coarse, ill-shaped, and rough, it will appear. How much want of regularity and proportion he will discover in it! But whether we examine the Almighty's works with the naked eye only, or with the best glasses, we shall still find them equally wonderful and beautiful. Perhaps, through the

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microscope, they will appear so different, that we should not think them what we had seen with the naked eye, but we shall ever find exquisite order, exactness, and symmetry in each form. Divine Wisdom has composed and regulated all the parts of each body with infinite art, by number, weight, and measure. Such is the prerogative of unlimited Power, that all his works are regular, and in perfect proportion. From the greatest to the lowest of his works, there is a wonderful order throughout. All is in such perfect harmony, all so well connected, that no void appears. In this immense chain of created beings, no link is wanting; nothing is useless; all is as necessary to the perfection of the whole, as each separate part is in itself complete and perfect. Can we describe the innumerable beauties, the various charms, the pleasing mixture of colours, the different hues, and all the ornaments of the fields, the valleys, the mountains, the forests, plants, flowers, &c.? Is there any work of God which has not its peculiar and distinct beauty? What is most useful, is it not at the same time the most beautiful? What an astonishing variety of form, figure, and size, do we behold amongst the inanimate part of the creation! but a still greater appears in the animate, though each is perfect, and nothing can be found otherwise in either. How wonderful must be the power of that Being, who, by a single act of his will, has given existence to all these creatures! But, to admire the Almighty Power, it is not necessary to go back to that time, when at his word every being was brought forth from nothing, and though created in an instant, yet in a state of perfection. Do we not each spring behold a new creation?—What can be more wonderful than the revolutions at those seasons? The valleys, the fields, the forests, all die, in some degree, towards autumn, and nature is stripped of its ornaments in winter. All animals languish; the birds retire, and cease to

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sing; every place becomes desert; nature appears insensible and dead. In the mean time a Divine Power acts in secret, and labours for the renewal of nature, unobserved by us. Animation is restored, and all things are preparing for a sort of resurrection. How can we so often behold this magnificent scene, without admiring, with the most profound veneration, the power and glory of God! How can we ever breathe the cool refreshing air, without being led to such reflections! Does not God proclaim himself throughout all nature, as well as by revelation? Never can I repose under the shade of a tufted tree, or behold a meadow enamelled with flowers, a beautiful forest, or waving corn; never can I gather a flower, or enter a garden, without remembering that it is God who gives foliage to the trees, beauty and perfume to the flowers, and a pleasing verdure to the woods and fields; that it is "he that bringeth food out of the earth, and wine and oil that maketh glad the heart of man." Struck with admiration, penetrated with gratitude and love, I cry out,—"O Lord! how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches."

SEPT. XXIX.

Fruit.

THIS is the happy season in which Divine Goodness lavishes all sorts of fruit upon us in great abundance. The charms of summer give place to more solid enjoyments. The boughs of the apple-tree bend under the weight of that golden fruit, the beauty of which is still heightened by its purple streaks. The melting pear, the plumb, sweet as honey, display their charms, and seem to invite the hand of their master. Should we not be un-

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pardonable, if the sight of these blessings, which we owe to the manificence of God, did not create in us grateful reflections, and by such means sanctify the pleasures of autumn? With how much wisdom has the Creator dispensed fruits for the different seasons! It is true, that, in general, it is in summer and autumn that nature presents them to us; but with the assistance of art we have them also in spring and winter, and can furnish our tables with some sort of fruit all the year round. From the month of June, Nature of herself presents us with raspberries, gooseberries, and common cherries. The month of July furnishes us with cherries, peaches, apricots, and some sorts of pears. The month of August seems rather to lavish than merely to give us fruit; figs, late cherries, and a number of excellent sorts of pears. The month of September already provides us with some grapes, winter pears, and apples.—The gifts which October bestows are several sorts of pears, apples, and the delicious fruit of the vine. It is with this wise œconomy that Nature measures out, and distributes her gifts; on the one hand, that too great abundance may not be a load to us; and, on the other, to procure us a constant succession and variety of enjoyments. It is certain that, in proportion as we advance in winter, the number of good fruits begin to diminish considerably, but art has taught us to preserve some for that season also. God did not think proper to dipense with man's trouble for such purposes, as it was a means to lead him to an active and laborious life. For this reason he distributed his blessings in such various ways; ordained that they should be spoiled, or lose their value, if they were not properly attended to. What profusion of fruit is bestowed upon us! Notwithstanding the ravages of birds and insects, there still remains a sufficient quantity to compensate for this loss. Calculate, if possible, the fruit which only an hundred

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trees bear in a good year, and you will be astonished at the prodigious increase. What was the design of such abundance? If the preservation and propagation of trees was the only intention of it, much less, certainly, would answer that end. It is therefore evident that the Creator designed to provide food for man, and in particular for the poor. In bestowing so much fruit, he has furnished them with easy means of subsistence; which is at the same time nourishing, salubrious, and so pleasing, that they have no reason to envy the rich their far-fetched dainties, so often prejudicial to health. There is hardly any food so wholesome as fruits. It was with a beneficent view, that Providence gave them to us in a season when they are not only pleasing and refreshing to us, but also excellent in a medicinal way. Apples come seasonably during the heat of summer, because they temper the heat of the blood, and cool the stomach and bowels. The plumbs have an acid sweetness, with an oily softening juice, which may make them useful in many cases. They gently open the body, and correct the acrid humours, which so often occasion inflammatory disorders. If some fruit, such as peaches, apricots, and melons, are found to be unwholesome, it is a proof they were not designed for our climate, or at least for persons who cannot guard against the bad effects of too cold fruit, by wine or aromatics. Nothing certainly is more delicious than fruit. Each sort has a flavour peculiar to itself. This variety renders them doubly pleasing to us. Thus God, like a tender father, provides not only for the support of his creatures, but also for their pleasure.

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SEPT. XXX.

The Faculty of Speech, how valuable if not abused.

THERE is nothing extravagant in all that has been said to enhance the value of the gift of speech. It is in reality the highest prerogative of man, and places us in a rank very superior to animals: for whatever traces may have been remarked in them of sounds to express their wants, &c. this can never be compared to human speech, which serves us to pursue a long course of conversation, introducing all sorts of subjects to communicate to others the most abstract ideas, and to carry on the thread of argument from its source to the most remote conclusions. It is this use of speech which we call conversation; and such being its importance, it is evident that a rational being ought to regulate it so as to make the best use of it, and yet nothing is more neglected. The rules of conversation may be reduced to three heads: it ought to be a means of instruction, a bond of society, and a source of pleasure. Instruction is the first thing a man requires on entering into the world. If he is not then as a blank paper, the characters at least that are traced in his mind are so superficial and confused, that he wants assistance to make them clearer, and to impress them more strongly. Accordingly, the conversation of the first years of our life are mostly devoted to instruction; we ask the questions which our curiosity suggests from every new object; and each answer, registered in our brain, increases our store of ideas. But the age of infancy, or even of youth, to which we limit this sort of conversation, is not enough.—There is no time of life in which we may not obtain information. A sensible man may draw some

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out of every conversation, by leading others to speak on subjects they are best acquainted with, and which he himself does not know. We do not deign to converse with a trades-person, or a labourer, and yet those people know a thousand ingenious things, of which we are totally ignorant. We meet persons who have travelled, who have been witnesses to certain interesting events; it is in our power to gain all they know, and will only cost us a little attention. We converse with a friend whose courses and studies agree with our own. What can we do better than to communicate our ideas mutually, to assist each other in our common inquiries, and to resolve together the difficulties which may embarrass us: thus, in some measure, to sharpen our wits, by rubbing them against one another, like the razor on the grinding stone. It has been often said, and proved, that the condition of men would be most deplorable, without the sweets of society. But what enables us to form societies? It is speech and conversation. It is by the same means that mankind are enabled to keep up general society, as well as those of a lesser sort, which we call families, where a certain number of people are always ready to fly to the assistance of each other, and to do them all sort of good offices. How invaluable, therefore, is conversation, as the bond of society. Many may think the idea here given of conversation too severe. They may say, that the mind cannot be always on the stretch for instruction, and that the bond of society does not always need binding closer by conversation; that there are many innocent and amusing subjects with which these have no connection. This is very true; and takes in a third rule of no little consequence, which is, that, if conversation does not promote one of those purposes, it ought at least to be entertaining. Recreation is an essential part of life, as it gives us strength to fulfil the duties of it. None is so natural, or so much within

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the reach of all the world, as engaging conversation, which makes time fly sweetly, and leaves the mind cheerful and composed. But is it thus that men converse? Are these rules observed? Alas! they are but too much neglected; and, with grief, I am going to shew the bad effects of it. Who is there that seeks information from society! Those first years, devoted to study, are scarce over, when a young man, impatient of restraint, shakes off the yoke. He is ashamed to seem ignorant of any thing, and takes great care to avoid the least appearance of diffidence, which might give suspicion there was any thing in the world he did not know. With a decisive tone he cuts short whatever is proposed. At a more advanced age, we think ourselves still more above all instruction. Old people especially are wonderful in this respect: What! teach me, at my age! This is a refuge for them which it is impossible to dispute. The strongest demonstrations of their ignorance serves only to make them shrug their shoulders. Shall I mention women's conversation, those particularly who seek to please? Who is there that does not know it is the very reverse of knowledge, sense? (I had almost said reason, if I had not feared the appearance of a satire.) The neglect of the second rule of conversation, which enjoins us to make use of it as a bond of society, is much the more dangerous, and yet it is continually abused. How often do men, instead of conversing, tear one another to pieces, like wild beasts mad with rage! But let us turn from such to another scene, where milder voices are heard, groups of people, who appear to talk without emotion, and even with pleasure in their countenances. Let us partake of the supposed sweets of their society. But, O poisonous sweets! perfidious and malignant joy! It is at the expence of their neighbours that they are so complaisantly merry. It is slander, with its odious colouring, which spares nei-

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ther friend nor parent. From hence proceed animosities, increased by reports, eternal discord, and confusion. In such socicties, the person most respected and caressed, were he privately to listen to his expected praise, would find himself cruelly deceived. Many conversations, exempt from these faults, often degenerate into disputes, through haughtiness, peevishness, or obstinacy. We love contradiction, and yet cannot bear it from others. What must be the consequence? The chief cause which prevents conversation from being universally amusing, and which is the last rule I shall mention, is *egotism*, that eternal desire of speaking of one's self. Nothing is more odd than conversation sometimes between persons so disposed. After the first words, the two parties equally contend who shall bring himself on the carpet. "I think so, I should do so," &c. The other, without attending in the least to what has been said, answers by speaking of himself. In the most serious situations, a person whom you consult, and whose advice and assistance you require, without the loss of a moment's time, loses those moments in that vain intolerable employment of saying what *he* would have done in your place, and then tells you events of his own life, which your situation recalls. I do not exaggerate; three-fourths of conversation consists of these interruptions, where each person follows his own ideas, and thinks only of himself. How can harmony proceed from such discord! One infallible means of pleasing in society, is a reflection with which I shall close this discourse. It is to carry with us a constant disposition to appear interested in all that others say to us, to listen to them with an air of satisfaction, and never to interrupt them, in order to speak of ourselves. This will never fail. Any one that follows this maxim will, without much trouble or wit, be more liked than the most brilliant genius. I do not, however, lay it down as a

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precept, to restrain one's self continually for those who will make no return; we are not obliged to do it. It is true, it would make us pleasing in society; but should we ourselves be pleased? It is only by an unanimous consent of men desirous of information, scrupulous not to offend their neighbours, and attentive to please, that we can hope to see those abuses banished, and thus to make a rational use of a faculty intended to ennoble and bless mankind.

OCTOBER 1.

Hymn to the Praise of God.

ALL the heavenly host glorify the power and majesty of the Creator, and all the globes which roll in the immense expanse celebrate the wisdom of his works. The sea, the mountains, and the woods, created by a single act of his will, are the harbingers of his love, the heralds of his power. Shall I alone be silent? Shall I not attempt to offer up thanksgiving, though the pure spirits themselves can offer but imperfect praise? By what power do those millions of suns shine with so much splendour? Who directs the wonderful course of the spheres? What chain unites them? What force animates them? It is thy breath, O Lord! It is thy almighty word. Thou art All in All. Thou calledst the worlds, and they obeyed. Then was our globe produced. The birds and the fish, the cattle, and the wild beasts of the wood, and, lastly man himself came to inhabit it, and rejoice. Our eyes are gladdened with variety of cheerful scenes. Sometimes they wander over the green field, or contemplate forests, whose lofty trees seem to touch the clouds. Sometimes they behold the dew-bespangled flowers, and trace the course of the limpid stream in which the trees are

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reflected. In order to break the force of the winds, and at the same time to afford us an enchanting scene, the mountains rise up, from whence burst forth the salutary springs. With rain and dew Thou waterest the parched valley, and with the zephyr's breath Thou coolest the air. It is through Thee that the hand of spring spreads the green lawn under our feet. It is Thou that gildest the corn, and givest purple to the grape; and when the severe frost comes to make all nature chill, Thou coverest it with a dazzling veil. Through Thee the mind of man penetrates even to the starry heavens. Through Thee he knows the past, and can distinguish falsehood from truth, the appearance from reality. Through Thee it is that he judges, desires, or fears; that he escapes from death, and from the grave.—Lord! I will ever acknowledge thy greatness. Thou who readest my heart, accept the emotions it feels, though unable to express them.

OCT. II.

The Effects of Fire.

NOTHING in nature can exceed the violence of fire; nor can we, without astonishment, reflect on the effects it produces, and the extreme swiftness of its operations. But how few are there who attend to its effects, or think them worth observation, though we daily experience the great utility of fire in domestic life! Perhaps this is the very reason we are generally inattentive to it. We ought, however, to remember this blessing, and, if possible, by reflection, learn the full value of it. There is one effect of fire which falls within every one's knowledge, that of dilating the bodies it penetrates. Irons, put into a metal plate, while they are new, swell so much in the

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fire, that they go in with difficulty; but as soon as they are cold, they are very easily taken out. This dilation produced by fire is still more visible in fluid bodies, such as wine, beer, and particularly in the air. If it were not for this property, the thermometer, by which we calculate the different degrees of heat, would be quite useless. Observe the effects of fire on inanimate and compact bodies; how soon it melts and changes them, part into fluid matter, and part into a solid of a different sort. It communicates fluidity to water, oil, fat, and to almost all metals.—What renders these bodies susceptible of this change is, that their combination is more simple, and the parts which compose them are more homogeneal than in other bodies; therefore the fire penetrates the more easily into their pores, and sooner separates the parts. This also causes these kinds of substances to evaporate when the fire penetrates in great quantity, and with violence, through them. Some solid bodies undergo other sorts of changes. Sand, flint, slate, and spar, vitrify in the fire; while clay turns into stone.—Marble, calcareous stones, and chalk, turn into lime. The variety of these effects does not proceed from fire, but from the different properties of the matter on which the fire acts. It may produce three sorts of effects on the same body, that of melting, vitrifying, and reducing to lime, provided the body be composed of the three several matters. The fire of itself produces nothing new; it only discovers parts which were concealed in those bodies. As for fluids, the fire operates in two ways upon them. It makes them boil, and reduces them to vapours. These vapours are formed of the most subtile parts of the fluid, joined with particles of fire. They rise up, because they are lighter than the air. In regard to living creatures, fire produces throughout their whole bodies the sensation of warmth. The life

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of man could not be preserved without this element, as we require a certain quantity of fire in our blood to keep it in motion. We every moment breathe new air, in which there is always some fire necessary to preserve this warmth and motion; whilst, on the other hand, we reject the air, which had lost its spring in our lungs, and was loaded with superfluous humours. These reflections will confirm to us this important truth, that God has, in every instance, promoted the good of mankind, and that he has endeavoured to place proofs of his love every where before our eyes. How many advantages accrue to us from the effects of fire only? By the union of fire and air the seasons return; the moisture of the soil and the health of man are preserved. By means of fire, water is put in motion, without which it would soon lose its fluidity. By the gentle motion it keeps up in all organized bodies, it gradually brings them to perfection. It preserves the branch in the bud, the plant in the seed, and the embryo in the egg. It prepares our food properly. It contributes to the formation of metals, and makes them fit for use. In fine, when we collect together the several properties of fire, we find that the Creator by that means has spread a multitude of blessings over our globe. A truth which ought to make great impression on our hearts, and teach us to love the Author of our being, and inspire us with contented minds. The more we search into the nature of things, the more we discover that all concur to the most perfect end. We every where behold magnificent plans, admirable order, constant harmony between the parts and the whole, between the ends and the means.

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OCT. III.

The Industry and Instinct of Birds.

THE birds have already afforded us many innocent pleasures. Now that the greater part of these sprightly inhabitants of the air are going to disappear for a long time, let us once more reflect upon them, with a lively sense of gratitude and joy towards God, their Author and ours. How pleasing is it to contemplate the several instincts with which each bird is endowed! None of them are useless or superfluous. Each is indispensably necessary to the preservation or welfare of the animal; and, little as we know of this, it is enough to give us the highest idea of the wisdom and goodness of God. When, in the first place, we reflect on the instinct which leads birds to move, we find in that alone just cause for admiration. Experience may convince us, that bodily motions require something more than strength, or well-formed supple limbs. It is not till after many trials and falls, that we are able to keep the balance, to walk with ease, to run, to jump, to sit down and rise; and yet these motions seem much easier to bodies constructed like ours, than to birds. These animals have but two feet; the body does not rest perpendicularly upon them: it goes beyond the feet, both before and behind, and yet a chicken can stand upright, and begin to run as soon as it is out of the egg. The young ducks, which have been hatched by a hen, know their element, and swim in the water without being directed to it by example or instruction. Other birds know how at once to rise from their nests into the air; to balance themselves there; and take their course, beating their wings in equal measure; to stretch out their feet, spread their

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tail, and make use of it as an oar; and often take long journeys into countries very remote from the place of their birth. How wonderful is the art we see them use, in order to provide themselves food; which art is born with them. Some birds, not in other respects aquatic, feed, notwithstanding, upon fish. They must necessarily have more difficulty in seizing their prey than the aquatic birds. What does their instinct teach them in this case? They keep on the shore of this foreign element, and when the fish come in shoals, which they can perceive at a distance, they pursue them, skim on the surface, and dive suddenly into the water, and carry off a fish. Who gave to the birds of prey their piercing sight, courage, and arms, without which it would be impossible for them to subsist? Who points out to the stork where it may find frogs and insects, on which it feeds? It must carefully search for them in the meadows, as well as in the furrows of the fields. It must even prolong its searches till near morning, when the other birds begin to waken. What incredible strength the condore must have, if it can, as it is said, carry off deer and oxen! How can we reconcile with the nature of the wild quail, that maternal instinct which makes her adopt little birds of every species, which she not only takes under her protection, but lavishes the tenderest cares upon them. What cunning the crows make use of to conceal the prey they cannot devour at one time! They hide it in places where other crows do not usually come; and when they are again hungry, how well do they recollect where they laid it! Many years might be taken up in pursuing observations of this sort, without being able still to explain the chief mysteries which the instincts of birds present to us; but the little we know is enough to employ, in the most pleasing manner, those whose hearts are disposed to contemplate the works of na-

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ture, and to raise them to still nobler views. It is there that we ought to be led, not to dwell merely on the instinct and faculties of birds; this ought to be but a first step to more sublime meditations. Let our admiration of these faculties raise us to God, from whom these animals have received them; and who has prepared and combined so many things for the subsistence and increase of this part of his creation. Let us not say, that it is from nature the birds learn the art and industry which so much surprise us in them: nature, separated from its Author, is an unmeaning word.

OCT. IV.

Animal Reproductions.

HERE we discover a new scene of wonders, which appears totally to contradict the principles formerly adopted, in regard to the formation of organised bodies. It was a long time supposed, that animals could only multiply by eggs, or by producing young alive; but we have since found that this principle is liable to exceptions, as we have discovered certain animal bodies, which can be divided into as many complete bodies as we please; because what is wanting to each piece, when thus separated, is soon repaired. It is no longer doubted that the polypus belongs to the class of animals, though it much resembles plants, both in its form and manner of propagating. The bodies of these insects may be cut in any way; and into as many pieces as they are cut, there will be so many complete polypuses. Even from the skin, or smallest bit cut off from the body, there will grow one or more of the polypuses; and if the several little bits cut off are put together by the ends, they unite, and become

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one and the same body. This discovery gave rise to other experiments; and it has been found, that the polypus is not the only animal which can live and grow after having been cut in pieces. The earth-worm also multiplies when cut in two; to the tail-part there grows a head, and the two pieces become two complete worms. After having cut the worm in two, it would be to no purpose to put them together, in order to unite them. They would not join. They remain some time in the same state, except that they grow more or less thin; then there appears, at the end of one of the pieces, a little whitish pimple, which gradually enlarges and lengthens. Soon afterwards the rings are seen, at first very close together, but insensibly extending on all sides. New lungs, new heart, new stomach, and many other organs, form with the rest. The following experiment may daily be made with snails:—Cut off the head, without going much below the two principal horns, and at the end of a certain time the head will grow again. It is the same with lobsters' claws. If one of them is broken off, and the lobster afterwards put into the river, it will, in a certain time, get a new claw. We are convinced, then, that some animals are perpetuated by being cut and divided, and that certain insects are produced in the same way as a branch shoots out of the trunk of a tree; that they may be cut in pieces, and that the smallest of these pieces will produce others; that they may be turned inside out like a glove, and still continue to live, eat, grow, and increase their kind.

Here then arises a question, which no naturalist possibly can resolve in a satisfactory manner. How does it happen that the parts cut off grow again? It must be presumed, in this case, that the germ is spread over the whole body, whereas in other animals it is confined to certain parts of it. The germ developes itself as soon as

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it receives proper nourishment: thus, the cutting the animal only supplies the germ with the nutritive juices, which would otherwise have flowed elsewhere, had not their course been diverted another way. Each bit of a polypus, or worm, contains in itself, like the bud of a tree, all the intestines necessary for the animal. Those parts essential to life are dispersed over the whole body: and there is a circulation even in the smallest particles. Besides this, we cannot comprehend all the means which the Author of nature makes use of to dispense life and feeling to such a prodigious multitude of beings: neither have we right to maintain, that the animals above mentioned are the only exceptions to the general rule, in regard to the manner of increasing. The fertility of nature, or rather the infinite wisdom of the Creator, surpasses all our weak conceptions. The hand which formed the polypus and the earth-worm, has proved to us, that, when necessary, it can make the animal form and constitution like simples or plants. It has done it still more in other cases; and, descending gradually, has arrived at the utmost limits of animal nature. But these limits are unknown to us. Let us therefore have a humble sense of our ignorance; let us admire and adore the Supreme Wisdom. Never is it more sublime than when we can no longer trace it. The animal reproductions remind me of the great change of our resurrection. What we now behold in miniature will then appear in the great. What we observe in other bodies, we shall experience in our own; and from the least parts will proceed a body destined to enjoy eternal happiness.

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OCT. V.

The Organs of Taste.

THE faculty of tasting and distinguishing variety of food, certainly adds to our enjoyments. The number of different fruits this season affords, naturally leads to this reflection: How much pleasure should we lose, if the apple, the pear, the plumb, and the grape, tasted all alike to us. The sense of taste is therefore a gift which we owe to the goodness of God, and on which we ought gratefully to reflect. But by what means do we distinguish and taste our food? It is by means of the tongue. For this purpose its surface is covered with little papillæ, a nervous substance, which enable us to distinguish the flavour of the salts as they dissolve upon the tongue. That the taste depends on the nerves, or sinews, may be observed by dissecting the tongue; for, after taking off the membrane which covers it, there appears a number of roots where the nerves terminate; and it is exactly where the papillary nerves are, that we have the sense of taste. Where they are wanting, our taste also fails. When we put high flavoured things upon our tongue, we are scarce sensible of it till they are attenuated; and it is not till then, or till we put them on the surface of the tongue, that we perceive their flavour; consequently, the sense of taste is not in full force, but where the papillary nerves are in greatest number, which is nearest to the throat. To be more convinced that our taste proceeds from the nerves, we need only examine the tongue of a dog, or cat. On the latter the papillary nerves are only placed on the back part of the tongue; the fore part of it has none, but their palate is quite full of these pa-

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pillæ, by which means they have no sense of taste in the tip of their tongue.

With what art must this organ of taste be formed, all the parts, of which no anatomist has yet been able to find out! Is it not the effect of the greatest wisdom, that the tongue should have more sinews and fibres than any other member, and that it should be full of little pores, to let the salt and other savoury particles penetrate deeper, and in greater quantity, into the papillæ? Is it not an effect of the same wisdom, that the nerves, which stretch as far as the palate and throat, to assist the mastication, should also reach to the eyes and nose, as if to give notice to the organs of those senses to contribute their part towards distinguishing the taste of food? The duration of these organs is another subject of admiration. However delicate their construction, they last longer than steel instruments. Our clothes tear, our flesh withers, our bones dry up, but the sense of taste survives them all, if we do not wantonly destroy it. What admirable designs may we not discover even in the preparations of those organs? O man! thou art the only creature who knows that he is endowed with senses, the only one capable of raising himself to God by the contemplation and use of his senses. Endeavour, with divine assistance, to employ these faculties properly. If thou wilt not acknowledge the wisdom and goodness of thy Creator, who is it then that shall pay homage to him? No creature enjoys what thou dost, even in the sense of taste; for the animals have but few things they like to feed on; whereas thy Creator has prepared thee variety equal to the abundance. Reflect on all that the animal, vegetable, and even the mineral world, affords you. The heavens and the earth, the air and the ocean, offer us their tribute. The tops of the mountains, the bottom of the valleys, the sea, and the lake, furnish us with food and pleasures. We have

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great reason to value highly this gift of our Creator; yet let us not value it beyond the purpose for which it was given. The sense of taste is only a means of leading us to nobler designs. It would therefore be madness to place our happiness in the pleasures of which this sense is the organ. It would degrade us to the rank of the brute creation, whose chief felicity consists in eating and drinking. Let us rather remember that we have an immortal soul, which can enjoy none but real blessings. To have a taste for such is the true wisdom and happiness of man.

OCT. VI.

The Providence of God in respect to natural Events.

ALL that happens in the sky, earth, sea, or air, is according to the laws prescribed by nature; but it would be absurd not to acknowledge a particular providence of God, which directs natural things, and makes them concur with his views. He makes use of natural causes to chastise or reward mankind. He prevents, or he assists the designs of man, sometimes by winds or storms, sometimes by the flux and reflux of the sea. It is true that God does not interrupt, in general, the course of nature; but it is no less certain, that nature cannot act forcibly without his assistance and concurrence. The parts of which the visible world is composed, have not the faculty to make use of their strength as they please. In the mean time, God can influence his creatures without interrupting the course of nature. Fire, water, wind, and rain, have their natural causes and particular virtues; but God makes use of them in a manner adapted to their nature, in order to fulfil his views. He makes use of the sun to warm the earth,

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and to render it fruitful. He employs the rain and wind to purify and cool the air; but it is always in the manner and degree that best suits his designs. A great part of the blessings and evils of this life proceeds from the objects around us. Now, as God interests himself in all which happens to mankind, he must necessarily direct those objects, and influence all nature. On this is founded the rewards and punishments of virtue and vice. He gives peace and prosperity to crown the one, and sends, when he pleases, famine and plague to punish the other. In a word, all natural causes are in the hand of God, and are immediately under the guidance of his providence. Men themselves may furnish an example of this. How often does their industry triumph over nature! They cannot indeed change the nature of things; but they can make use of natural causes so as to produce effects from them which would not have taken place without the art and direction of man. Now, if God has in some measure subjected natural causes to human industry, with how much more reason may he reserve to himself the government and direction of them! We may from hence conclude, how necessary it is that a particular providence should watch over the guidance of the world. Natural causes are certainly excellent instruments; but, in order to make them useful, they ought to be in the hands of a wise Being. It would be unreasonable to wish that God should every moment change the laws of nature once established; that, for example, if we fall into the fire, or into water, we should not be consumed or drowned. Neither is Divine Providence obliged to preserve us, if we shorten our lives through intemperance. For God is not obliged to work miracles to save men from misfortunes drawn upon themselves by their own irregularities. It is our duty to attribute to Providence all those particular and beneficent dispensations which relieve our wants, and restore our

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hearts to peace: But all the disorders of nature are at the same time effects of God's anger, which serve to punish mankind. On this truth we found our prayers for the heavenly benediction, and our thanksgivings for all the blessings which God bestows upon us.

OCT. VII.

The inexhaustible Riches of Nature.

NATURE is so bountiful to us, so abundant in means to supply the wants of every creature, so rich in gifts, that they can no more be numbered than the drops of the ocean. How many things does one single man require, during a life of sixty years, for his eating, drinking, and clothing, and for the sweets and conveniencies of life, for pleasure, amusement, and society, without mentioning extraordinary cases, and unforeseen accidents! From the king to the beggar, in all situations, conditions, and ages of man, from the infant to old age, in every country, and according to the different manners of the people, each man has his particular wants. What suits one will not suit another; and they all require different means of subsistence. Yet we find that nature can answer all these demands, and that each individual is supplied with all the necessaries of life.—Since the first existence of the world, the earth has never failed to open her bosom. The mines have never been exhausted. The sea affords subsistence to numberless creatures. The plants and trees constantly bear seed, which shoot in due season, and become fruitful. Beneficent Nature varies her riches, that one place may not be too much exhausted; and when some sorts of plants or fruit begin to diminish, others are produced; and it is so ordered that the instinct and taste of mankind

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should lead them to the most abundant productions. Nature is a wise economist, and takes care that nothing is lost. Insects serve as food for larger animals, which, in their turn, are useful to man. If they do not afford us food, they furnish us with clothes, with arms, and means of defence; and if with none of these, they at least supply us with salutary medicines. Even when diseases sweep off some species of animals, nature repairs the loss by the increase of others. Not even the dust, the carrion, or putrid corrupted matter, but has its use, either as food for insects, or for manure to enrich the earth. How beautiful is nature! Her finest clothing requires only light and colours. She is abundantly provided with them; and the scenes she presents are continually varied, according to the points of view in which they are seen. Here the eye is struck with the beauty of form; there the ear is charmed with melodious sounds; and the smell is indulged with agreeable perfumes. In other places art adds new embellishment to nature, by a thousand industrious works; the gifts of nature are so abundant, that even those that are continually made use of never fail. Her riches are spread over the whole earth. She varies her gifts according to the different countries. By means of commerce she connects different nations, and the hands through which her gifts pass, make them more valuable by the continual circulation: She combines and mixes her gifts, as the physician does his medicinal ingredients.—The great and the small, the handsome and the ugly, the old and new, combined and mixed with art, form one whole, equally useful and agreeable. Such are the inexhaustible riches of nature in the hands of God.

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OCT. VIII.

Petrifactions.

THE transmutation of several substances, from the animal and vegetable kingdom into the mineral, is a circumstance in natural history well worthy our attention. The first thing to remark in petrifactions, is their exterior form, which shews that these fossils have undoubtedly belonged either to the animal or vegetable kingdom. It is very unusual to find human petrifactions, or those of quadrupeds. The most extraordinary skeletons met with in the earth are those of elephants, which are found even in many parts of Germany. Petrifactions of aquatic animals are frequently met with. There are sometimes fish entirely whole and perfect, even to the smallest scales: but this is nothing in comparison of the multitude of shell-fish, and little worms, found changed into stone in the bowels of the earth. Their number is not only prodigious, but there are more different species of them than are to be found alive. Sea petrifactions are found in great abundance all over the world. There are some on the tops of mountains, that are many thousands of feet above the surface of the sea; quantities are found on the earth, at different depths. All sorts of petrified plants, or pieces of plants, are met with in several beds of the earth; but there is often the impression only, the bodies themselves being destroyed. In many places whole trees are found buried more or less deep into the earth, and turned to stone. These do not appear to be old petrifactions. But how have all these petrified substances got into the earth, and particularly, how can they have got upon such high mountains? How have sea-animals been transported so

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far from their natural abode? Different causes may be assigned for this. Perhaps these petrifactions prove, that the greatest part of the earth was formerly covered with water. And indeed, as in every place where we search, from the top of the mountain to the greatest depths into the earth, all sorts of marine productions are found, it seems as if it could not otherwise be accounted for. The great quantity of petrified shell-fish found at considerable heights, forming regular beds, give reason to believe the mountains were formerly the bottom of the sea: and so much the more so, as we know that the present bottom of the sea is exactly like firm land. We have hitherto but a very imperfect knowledge of the manner in which nature operates these petrifactions. It is certain that nothing will petrify in the open air; for the bodies of animals or vegetables consume or corrupt in this element; so that air must be excluded, or at least not act where petrifactions are formed. Neither has a barren dry earth any petrifying quality. Running water may form a crust on particular bodies, but cannot turn them into stone. The very course of the water prevents it. It is probable, therefore, that petrifactions require moist soft earth, mixed with dissolved stony particles. The stony juices penetrate into the cavities of the animal body, or the vegetable, impregnate and unite with it, in proportion as the parts of the body itself evaporate, or as they are absorbed by alkaline substances. We may draw some inferences from thence, which explain these phenomena of nature. All animals and vegetables are not equally capable of being turned to stone; for, in order to be so, they require a degree of hardness, to prevent them from corrupting, before they have time to petrify. Petrifactions are generally formed in the earth, and require that the places where the bodies are placed should be neither too dry nor too wet. All sorts of stones which contain petrifactions are the

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work of time, and consequently they are every day still forming; such as chalks, clays, sands, the magnet, and others. The petrified bodies take the nature of these stones, and become sometimes chalky, sometimes like slate, &c. If petrifactions were of no other use than to throw light upon the natural history of our globe, they would, from that circumstance alone, be worthy our attention: but we may also consider them as proofs of the operations and transmutations which nature produces in secret; and here, again, appears most wonderfully the power and wisdom of God.

OCT. IX.

Every thing in Nature is gradual.

WE may observe in nature an admirable gradation, or insensible progress, from a simple to a more compound perfection. There is no middle species which has not something of the nature of that which precedes, or that which follows it. In a word, there is no void or leap in nature. Dust and earth form the principal and the component matter of all solid bodies. It is accordingly found in all those which human art has analysed. From the mixture of salts, oils, sulphur, &c. with the earth, there result different kinds of soil, more or less compound, light, or compact. This naturally leads us to minerals. The variety of stones is very great; their form, colour, size, and hardness, are very different. All sorts of metallic and saline particles are found in them; and from hence proceed mineral and precious stones. In the last class of stones there are some with fibres and a sort of leaves; such as slate, talc, the lithophites, or marine stony plants, and the amianthus, or the stony flower of the mine; which leads us from the minerals to the vegetables. The plant which appears

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to be the lowest among the vegetables is the truffle. Next comes the numerous species of mushrooms and mosses, between which the hoar or mould seems to take its place. All these plants are imperfect, and, properly speaking, only form the limits of the vegetable world. The more perfect plants divide into three sorts, which are dispersed over the whole earth; grass, shrubs, and trees. The polypus seems to unite the vegetable to the animal race. From the outward appearance, this singular production would only be taken for a plant if it was not known to perform real animal functions. The zoophite forms the link between plants and animals. Worms are the lowest of the animals, and lead us to insects. Those worms which have their bodies inclosed in shells, seem to unite insects to shell-fish. Between them, or rather next to them, come reptiles; these, by means of the water-snake, are linked with the fish. The flying-fish leads us to the bird species. The ostrich, which has legs something like the goat's, and which rather runs than flies, seems to link the birds with the quadrupeds. The ape joins hand with man and beast. There are gradations also in human nature, as well as in every thing else.—Between the most perfect state of man and the ape, there are a wonderful multitude of links; how many more still are there between men and angels! how many between the archangel and the Creator of all things! Here we behold a new train of gradation, new plans, and new perfections. But an impenetrable veil conceals from us those of the world to come.

What has been said is sufficient to shew that every thing in the universe is closely linked together. There is nothing without design: nothing which is not the immediate effect of something which preceded it, or which does not determine the existence of something which is to follow. Nature goes by degrees, not suddenly, from the

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component to the compound, from the less to the more perfect, from the nearest to the more distant, from the inanimate to the animate, from bodily to spiritual perfection. But how imperfect still is our knowledge in this immense chain of beings! We can but half distinguish them, and know but a small number of ill-connected broken links; and yet, defective as our knowledge is in this respect, it is enough to give us the highest idea of the wonderful chain and infinite variety of beings of which the universe is composed. The whole leads us to Thee, Thou Supreme Being, although there is between Thee and us a distance which no understanding can measure. Thou art the only Being beyond the chain of nature: from the grain of sand to the cherubim, every thing owes its existence and perfection to Thee.

OCT. X.

The Fall of the Leaf.

WE begin to perceive the effects of approaching winter in the woods and gardens. Almost all the plants are losing their leaves, their chief ornament. The most natural way this can be accounted for is from the cold; for the leaves are no sooner covered with frost, than they begin to fall in abundance, and all the vegetables are stripped of their clothing. It cannot be otherwise, as the cold causes the sap to stagnate in the plants. But the cold is not the only cause of the leaves falling; for they fall when it does not freeze the whole winter, and when the trees are even put into green-houses to preserve them from cold. It is therefore probable that other causes also contribute to strip the trees. Perhaps they wither because the root no longer supplies what is necessary for their perspiration. For it

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it is certain that the branches grow in thickness when they no longer grow in length. At the time, then, when the branches continue to grow thick, and the stalks of the leaves do not do so, the fibres of the leaves must necessarily loosen from the fibres of the branches, and then the leaves fall off. But we must not suppose that these fallen leaves are entirely lost, and of no use. Reason and experience teach the contrary. These leaves, which grow rotten when they are fallen, make manure for the ground. The snow and rain wash the salts out of them, and convey them to the roots of the trees. These strewed leaves, heaped together upon the young plants, preserve their roots. They cover also the seeds, and keep them warm and moist. This is more particularly observed in respect to the oak-leaves. They afford excellent manure, not only to the tree itself, but also to its shoots; and are also very useful for forest pasture, as they increase the growth of the grass on which they fall and rot.—This is so important an advantage, that the fallen leaves are never taken up to make dung of, unless they are in such abundance in the forests, that the grass is rather choaked up than nourished by them.—Leaves are spread in stables instead of straw, and make a good litter for cattle, or are mixed with common dung. This mould is particularly useful in gardens, where they make layers of it which assist greatly the growth of fruit and young trees. But possibly it may be said, that the fall of leaves is destructive to a multitude of insects that live on trees and plants. It is true that autumn sweeps away whole shoals of insects, with their nests; but does it follow from thence that these little creatures perish? Why may they not live even on the ground under the leaves which cover and guard them from the cold. The fall of the leaf is an emblem of this life, and the frailty of all earthly things.

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OCT. XI.

Different Sorts of Earth.

WE can only form conjectures of the inside of the earth. Those who work in the mines have never been able to go lower than 900 feet, which is scarce the twentieth part of a German league. If they attempted to go farther, the too great pressure of the air would kill the men, supposing even they could protect themselves from the water, which fills more and more in proportion as they descend lower. Now, what is the twentieth part of a German league, in comparison of half the diameter of the earth, which is 860 leagues? The inside of the earth must consequently be in a great measure unknown to us. The labours of the miners have scarce even reached below the first coat of it. All that we know is, that when they dig some hundreds of feet, this coat is found to be composed of several different layers or beds placed one over another. These beds are much mixed; and their direction, substance, thickness, and respective positions, vary considerably from one league to another. Generally under the common earth in gardens they find white clay and rich earth; but sometimes the sand, clay, and marl, mix by turns. In comparing the observations which have been made, the best account appears to be that which divides them into several sorts of earth.

Black earth is composed of putrid vegetable or animal substances. It contains salts and inflammable matter. This is, properly speaking, dung. White clay is more compact than the black earth, and retains water on its surface longer. Sandy ground is hard, light, and dry. It does not retain water, nor dissolve in it. It is the worst of

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all land, though some plants do grow in it. Marl is softer, more mealy, and attracts moisture better. Marshy ground contains salt of vitriol which is too sharp for the plants. Chalk is dry and hard. Some plants, however, grow in it. There grow some even in stony ground. The smoothest stones, however bare of earth, are at least covered with moss, which is a vegetable; and we see birch growing between the stones and in the crevices of rocks to a considerable height. The Creator has most wisely prepared those different sorts of earth of which the beds are composed. For, to mention nothing more than the principal advantages which result from them, these several beds of sand, gravel, and light earth, give passage to spring water, which filters in running over these beds, becomes soft, and then, dispersing on every side, supplies water for general use. Those beds are the reservoirs of springs. It is remarkable that they are to be found in every country on the surface of the earth, and that they are generally composed of a light earth. If it is sometimes mixed with a harder and more gravelly soil, it purifies the water so much the more. This variety of soil is very useful also for vegetables. It is from this circumstance, that herbs, plants, and trees, grow of themselves in some countries, while they can only be produced by art in others. All that art can do is to imitate nature, which prepares for the plants that come of themselves the soil, the nutritive juices, and the warmth, most proper for them. The variety of soil will make herbs, trees, and roots, though of the same kind, differ according to the soil they grow in. It often happens in the same soil that some plants thrive, while others fail. The same fruit has a different flavour in one country from what it has in another. When plants have weak small fibrous roots, without much sap, they ought to be sowed and planted in a sandy light soil, that

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the roots may spread more easily, by meeting with little resistance, that the rain may better sink into them, and that they may not meet too many saline, acid, and oleaginous particles. It is asserted, that in the space of 48 hours, lettuce, cauliflower, salad, &c. may be produced fit to eat, by steeping the seed in brandy, and afterwards putting it into the ground, mixed with pigeon's dung and lime dust.—Vegetation requires a prepared soil always.

These observations lead us to acknowledge the wisdom with which the Creator has prepared every soil for the production of plants, for the good of his creatures. How unjust, therefore, would it be to complain of the sterility of such and such lands. Divine Goodness has always ordained, that the countries allotted for man to live in should produce all that is necessary for his subsistence. If there are lands which appear less fertile than others, the Creator has made amends for this defect by greater advantages, or he inspires man with so much the more industry.

OCT. XII.

Wine.

WINE is a gift we owe to Divine Goodness, and which ought to create in us admiration and gratitude. God not only gives us bread, and other food, in abundance, but has vouchsafed also to indulge us in pleasure, and has created the vine, to render our lives the happier, and to be of use to our health. Other drinks, whether natural or not, do not equally produce these effects. Wine alone can banish sorrow, and give those spirits which both body and mind require. Wine recruits strength when exhausted by fatigue. Bread enables a man to act, but wine makes him

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act with spirit, and renders labour easy. Spirituous liquors cannot spread over the countenance the air of cheerfulness which wine gives. Let us here reflect on God, who gave to this salutary juice qualities so superior to the poorness of its origin, and the dryness of its native soil. The Creator produced these effects only by the three chief particles of which all wines are composed, oils, salts, and volatiles. How greatly does Divine Goodness shew itself in the abundance and variety of wines granted to us. The different sorts are numberless. They vary in colour, smell, taste, quality, and duration. We may say, that there are almost as many sorts of wines as soils; and the Creator has allotted to each country such wines as are best adapted to the climate, as well as to the constitution and way of life of its inhabitants. But how sad is it to see men conduct themselves as they do, in respect to the use of wine. There have been legislators who severely prohibited the use of it; and this not from consideration for the health and morals of the people, but from false economy, or sometimes merely through fanaticism. It is certain at least, that it is to these united causes we must attribute Mahomet's prohibition of this liquor. This objection to wine is so much the more irrational, as most of those who prohibit the use of it do not forbid the eating of grapes. Another fault which many are guilty of, is the adulteration of wines. The human heart in this displays its worst qualities. Can any thing be more horrid? A poor person, who is sick, tries to relieve his misery, and out of the pittance his labour affords him, purchases a little wine to recruit his strength, and soften his pains, and they who adulterate wine have the barbarity to aggravate his evils, and to make him still worse, by presenting him poison, which, instead of restoring the health and strength he hoped for, may be the cause of his death. But a still more

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shameful and deplorable abuse of it is, when men poison themselves by excess. This liquor is a salutary medicine, which supports animal life and the vital spirits; it warms and animates the blood, and restores our health; but the continual and excessive use of wine makes it no longer salutary. This liquor is to the human body what dung is to trees. It forwards the fruit, but it hurts the tree. A wise gardener does not continually dung and manure. He only does it at proper seasons. He gives manure to his trees when they require it, and only gives it in proportion to their nature and want of it. This is the proper regimen of wine. Let us always remember it is only given us to refresh and recruit our spirits; and let us never abuse a blessing bestowed upon us by Divine Goodness.

OCT. XIII.

Migrations of the Birds.

THIS is the time when numbers of the birds, which, during summer, had lived and found food in our fields, woods, and gardens, are going to quit our climate for other countries. There are but few of them which pass the winter with us; the loriot, the woodpecker, the crow, the raven, the sparrow, the wren, the partridge, and the thrush. The rest leave us almost the whole winter. This migration is wonderful in all respects; and if we have not much attended to these creatures while they were with us, let us at least think of them now they are gone. Some birds, without taking their flight very high, and without separating from one another, draw gradually towards the south, to seek the seeds and the fruit they prefer; but they soon return back. Others, which are called birds of passage, collect together

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at certain seasons, go away in large bodies, and take their flight into other climates. Some kinds of them are content with going from one country to another, where the air and food draw them at certain seasons. Others cross the seas, and undertake voyages of a surprising length. The birds of passage most known, are quails, swallows, wild ducks, plovers, woodcocks, and cranes, with some others which feed on worms. The quails in spring go from Africa into Europe, in order to enjoy a more moderate heat. They go in flights, and look like clouds. They often fall, through fatigue, into ships, and are easily taken. The method of the swallows is different: some cross the seas, but many of them stay in Europe, and hide themselves in holes under ground, or in marshes, fastening themselves to one another, claw against claw, and bill against bill. They gather thus together in heaps out of the way of men and animals. Wild ducks, and cranes also, at the approach of winter, seek milder climates. They all assemble on a certain day, and divide company. They generally form themselves into two lines united in a point, like a ⊳ reversed, with a bird at their head, and the rest in rows, which always extend in that manner. The duck or crane, which forms the point, cuts the air, and makes way for those which follow; and these always lay their bills on the tails of those which go before. The leading bird is only charged with this commission for a time: he goes from the point to the tail, in order to rest, and he is relieved by another. But all birds of passage do not assemble in flights. Some take the voyage quite alone; others with their mates and all their family; others in small numbers. They make their passage in a very short time. It has been computed, that they may easily fly 200 miles a-day, in flying only six hours, supposing them to rest now and then in the day as well as at night. According to this calculation,

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they might fly from our country, even as far as under the line, in seven or eight days. This has been verified, as swallows have been seen on the coasts of Senegal, from the ninth of October, which is eight or nine days after their departure from Europe. These migrations of the birds cannot be too much admired. Certainly the difference of heat and cold, and the want of food, warns them to change place. But what is the reason, that, when the air is so mild that they might remain in it, and that they find enough to eat, they still never fail to go at the appointed time! How do they know that they will find food and the proper degree of heat in other climates? What is the cause of their going all at the same time out of our countries, as if they had unanimously fixed beforehand their day of departure? How do they contrive in dark nights, and without knowing the countries, to pursue their direct road constantly? These and other questions, on this interesting subject, are embarrassing, and have not yet been answered in a satisfactory manner, because we are not enough acquainted with the nature and instinct of these animals. We may, however, behold in their migrations the wise and beneficent direction of Providence. What wonderful means are made use of to preserve and give food to certain birds! With what tender care is their subsistence pointed out to them, when it fails them in some regions! Let us learn from thence, that every thing throughout the vast empire of nature is planned with infinite wisdom. Is not instinct to the birds of passage, what reason is to man? and does it not equally instruct them in this point, of changing place in proper seasons? How ought we to blush at our incredulity, our doubts, and our anxieties, when we reflect on the admirable guidance of Providence! This God who points the way to the birds in the air, will he not with equal goodness

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guide us whom he has vouchsafed to endow with reason? Shall man, the Lord of all, be less the object of his care? Let us then with joy confide in his merciful protection. Let us walk in his ways, and we cannot fail of happiness.

OCT. XIV.

The Variety of Trees.

THERE is the same variety among the trees as in the vegetable productions. Some are distinguished by their strength and roughness, like the oak. Others are tall and slender, as the elm and the fir-tree. There are some, such as the thorn and the box, which never grow high. Some have rough and uneven coats, while others are smooth and fine, like the birch, the maple, and poplar. Some are made use of in nice ornaments for the apartments of the great and rich, while others serve for common and more necessary purposes. Some are so slight and delicate, that the least wind might blow them down; others stand unshaken, and resist the violence of the northern blasts. Some grow to a prodigious height and thickness, and every year, after they are an hundred years old, seems to add to their circumference; while others require but a very few years to come to their full growth. Pliny, in his time, admired those great trees, the shell or bark of which was thick or large enough to be made into sloops to hold thirty people: but what would he have said of those trees in Congo, which, when hollowed out, make vessels to contain 200 men, or of those which, according to the accounts of travellers, are eleven feet in diameter, and can bear 400 or 500 stone weight carried on them. There are some of this kind at Malabar, which are said to be fifty feet in circumference. The cocoa-tree is one of them, a sort of

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palm-tree, some of which have leaves large enough to cover twenty people. The tullipot, a tree which grows in the island of Ceylon, and for height resembles the mast of a ship, is equally famous for its leaves. They are so immense, that it is said that one single leaf can shelter fifteen or twenty men from the rain. They are so supple, when dried, that they may be folded up like fans, and are then extremely light, and appear no larger than a man's arm. There are still on mount Libanus, twenty-three old cedars, which are said to have escaped the deluge. A learned person, who saw them, assures us, that ten men could not encompass one of those cedars: they must therefore be thirty or thirty-six feet in circumference, which does not appear too much for trees some thousands of years old. The gum trees, which grow in the islands of America, are generally twenty-six feet in circumference. It is not likely, then, that the cedars are as old as they say; though it is certain that trees live to a great age. There are apple trees above a thousand years old; and, if we compute the quantity of fruit such a tree bears annually, we must (as has been before mentioned) think with astonishment of the prodigious fertility of a single pippin, which could furnish all Europe with trees of this kind.

The great variety among trees reminds me of the difference we observe among men, in regard to their situations in life, their way of thinking, their talents, and the good they do. As there is not a single tree in a forest which may not be of some use to its owner, so there is not one in society which may not be useful. One, like the oak, gives an example of firmness, and of unshaken constancy, which nothing can move. Another has not equal fortitude, but has more complaisance, and conforms to others: he is flexible as the willow, and yields to a breath of wind. If he is virtuous, he will only comply in lawful and

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innocent points; but if he is indifferent to his duties, he will always embrace the strongest side. However different the trees may be from one another, they all belong equally to the sovereign of the world; all are nourished by the same earth; all warmed by the same sun, and refreshed by the rain equally. Would to heaven that all men, however different from each other, would unite in acknowledging that they are all equally God's creatures, equally subject to his power, equally the objects of his tender mercies; all indebted to him for their existence and support, as well as for the talents with which they are endowed. The cedar which rises majestically on the top of Mount Libanus, and the briar which grows at his feet, are equally nourished by the juices of the earth, and the rains. So is the divine blessing equally necessary to the rich as to the poor. The high and mighty amongst men should always remember that it is to God alone that they owe their elevation and greatness. By him only can they be preserved; for in an instant he could root them out, and sink them low as the dust. This thought will repress every motion of pride, which might arise in our hearts, and inspire us with due submission and obedience to the Author and Preserver of our lives.

OCT. XV.

The Temperature in the different Climates of the Earth.

IT seems as if the temperature and warmth of countries depended on their situation in respect to the sun, as it casts its rays in the same manner on all countries which are in the same latitude. But experience tells us, that heat and cold, and all the temperature depend on many other cir-

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cumstances. Seasons may be very different in places under the same parallel; and are, on the contrary, often very like under very different climates. Therefore, as accidental causes may make the heat very different in the same latitude, and as it is very far from being such as the distance of the sun would seem to promise, it is difficult to determine exactly the seasons and temperature of each country. The neighbourhood of the sea renders the climate milder. England and the coasts of Norway are strong proofs of it: the sea may be covered with ice near the shore, because it mixes there with fresh water; but it never happens at any considerable distance from land, both from the salt of which the sea is full, and from its being in continual motion. By the sea not being frozen in winter, the climate of the adjacent countries is milder. On the contrary, the higher a place is above the sea, the colder it is. The air is not only thinner there, and consequently contains less warmth, but the greatest part of the heat produced by the earth's reflecting the rays of the sun, falls on low places and valleys, and does not reach heights. Besides, if there is, as it is pretended, a subterraneous and central fire, the highest places are most distant from it. *Quito* is almost under the line, but the heat is moderate, from its high situation. In general, those sort of countries have serene and clear air, and an equal temperature. High mountains attract clouds, which occasion more frequent rains and storms in hilly countries than elsewhere; and it has been observed, that it scarce ever rains in the plains of Arabia. Countries where there are great extensive forests are very cold: the ice melts more slowly there in winter, because it is covered with the shade of the trees. The ice makes the upper air cold, and this delays the thaw. Another circumstance also tempers the heat of warm climates: their days are not long, and the sun

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does not remain long above the horizon. In colder countries, the summer days are very long, which makes them warmer than could be expected. The serenity of the sky, the clear light of the moon, and the long twilights, render long nights supportable. Under the torrid zone, the seasons are not so much distinguished by winter and summer, as by dry and wet weather; for when it ought to be summer, that is, when the sun is most above the horizon, and its rays fall in as direct a line as possible, then come the rains, which fall more or less for some time. But in those countries, the most pleasant season is that in which the sun is at the lowest. In the countries beyond the tropics, the weather is generally more uncertain than within the tropics. It is in spring and summer that the winds are highest. In winter, the ground freezes more or less deep, but seldom in our climate more than three feet. In more northern countries, it freezes deeper in winter, and only thaws a few feet in summer. Stagnant waters, and even rivers, are covered with ice, first near the shore, and then over the whole surface of the water. The different qualities of the soil, as they retain more or less of acquired heat, contribute also, in some degree, to vary the climate.

In all these plans, what wonderful wisdom and goodness appears! in thus regulating the seasons and climates of the different countries, the Creator has made every part of the earth habitable. We often form wrong opinions of the torrid and the frozen zones; and foolishly imagine, that the inhabitants of those regions must be most miserable people. Happily for the world, and to the great satisfaction of all feeling hearts, it is certain that the people of the most distant countries, without even excepting those who live under the line or under the pole, enjoy the portion of happiness suited to their nature and destination. Each coun-

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try has its advantages and inconveniencies in such equal proportion, that it would be difficult to decide which of them merits the preference. There is not a corner of the world in which God has not displayed his goodness.

OCT. XVI.

Atmosphere of the Earth.

THE air which surrounds the earth is not as pure and subtile as æther; for it is loaded with all the particles or vapours which are continually rising out of the earth, and particularly from the water. This is called atmosphere. Its lower region, that is to say, what is nearest to the earth, is pressed upon by the upper air, and from thence becomes more thick and dense. This is experienced by those who go to the top of high mountains. Their breathing becomes more painful in proportion as they ascend. But it is impossible to ascertain the exact height of the atmosphere, because we cannot rise very high in the air. Neither can we draw a positive inference from the duration of twilight, how far this mass of air extends: For, supposing the morning twilight to begin, and evening twilight to end, when the sun is eighteen degrees below the horizon, and that the latter twilight is produced by the rays which strike the earth, and are reflected by the highest parts of the atmosphere, there would still remain many difficulties to clear up.—The atmosphere is divided into three regions. The lower one reaches as high as where the air receives no warmth from the rays which the earth reflects. The middle region begins where the preceding one ends, and goes as high as the highest mountains, or even as far as the highest clouds, and in the space where

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the hail, rain, and snow collect. This region is much colder than the lower; for it is only warmed by the rays which fall perpendicularly, and in a direct line upon it. But the third is probably still farther. It reaches from the middle to the extremity of the atmosphere, and we cannot precisely ascertain its limits.

The particles which rise out of the earth, and form the atmosphere, are of different natures. They are watery, earthy, metallic, sulphureous, &c. Now, as some abound more than others in certain parts of the earth, it occasions great variety in the air, and this difference is very perceptible even at a little height. A heavy air is more wholesome than a light one, because it promotes the circulation of the blood and insensible perspiration. When the air is heavy, it is generally serene; whereas a light air is always attended with clouds, rain, or snow, which makes it damp. vapours increase the weight of the air; and particularly when the heat sends them up very high, the air is still light, notwithstanding the watery vapours with which it is filled. Too great a drought dries up the human body, and is consequently very hurtful; but it is seldom the case, except in very sandy countries. A damp air is also very unwholesome, for it relaxes the fibres, stops the insensible perspiration, and if it is warm at the same time, it is apt to occasion putrid disorders. The heat of the air dilates the fluids of the human body, and brings on sweats, which weaken and oppress. When, on the other hand, the air is too cold, the solids contract, and the fluids thicken, which causes obstructions and inflammations. The best air, therefore, is that which is rather heavy than light, neither too dry nor too moist, and but little or not at all mixed with noxious vapours. It is in the atmosphere that the clouds, the rain, snow, dew, thunder, and several ethereal phenomena, are formed. It is to the at-

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mosphere also that we owe the morning and evening twilights. As the rays break and bend in this mass of air, we see them before the sun appears, and we enjoy them after it has set. By this means, those who live under the pole enjoy some rays of the sun in winter, even when it is below the horizon. The atmosphere is the mansion of the winds, which have such influence on the fertility of the earth, and on the health of mankind. Cities and provinces would soon be unpeopled, and changed into melancholy deserts, if the air was constantly calm, and if there were not storms and tempests to purify it, and to disperse to a distance those noxious vapours which rise continually into the atmosphere.

How much reason have we to bless God for this plan so beneficial to us. If there was no atmosphere, or if it was different from what it is, our globe would be a chaos, and a most melancholy place to inhabit. Let us then acknowledge with gratitude the wisdom and goodness of the Creator, who has regulated every thing in nature, so as to be most conducive to the happiness of the beings he has formed..

OCT. XVII.

Proportion between Births and Deaths.

THAT God has not left the life of man to a blind chance, but that he watches over us with parental care, appears evidently in the exact proportion there has ever been, at all times, and in all countries, among mankind, in respect to their entrance into the world, and their quitting it. By means of this balance, the earth is neither too empty nor too full of inhabitants. "The number of those who are born is generally greater than of those who die;" for it is calculated that for ten who

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die annually, there are twelve or thirteen born. Thus, the human kind continually multiplies. If it was otherwise, if the number of deaths exceeded that of the births, a country must of course be unpeopled at the end of a few centuries; particularly as many obstacles may prevent population, such as the plague, war, famine, celibacy, and, lastly, cities, especially those that are most populous, for in them there die at least as many as are born. It appears from the christening registers, that there are "more boys than girls born." The proportion is generally from twenty to twenty-one; so that to a thousand female children, there are a thousand and fifty males. But the equality between the sexes is restored by deaths in the military way, and by many other accidents. There are generally more women than men in cities, and the contrary in the country. The number of children in families is also regulated with great wisdom. It is computed that in sixty-six families there are but ten children baptized in a year. In a populous country, out of fifty or fifty-four persons, there is but one married every year; and each marriage, one with another, produces four children; but in cities we generally reckon but twenty-five children from ten marriages. A fourth part of every country is composed of men fit to bear arms. In comparing the bills of mortality in different countries, it is found, that in common years, that is to say, when there has been no epidemic disorder, there dies one out of forty in villages; one out of thirty-two in little towns; one out of twenty-eight in middling towns; one out of twenty-four in populous cities; one out of thirty-six in a whole province. For a thousand that live, there annually die twenty-eight. Out of a hundred children that die in a year, there are always three that come dead into the world; and there is scarce one out of two hundred that dies in the birth. They compute that but one woman out of an hundred and

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fifteen dies in child-bed; and but one out of four hundred that dies in labour-pains. The time of the greatest mortality with children is in the first year. There generally die two hundred and ninety-three out of a thousand at that age. But between their first and second year there die only eighty. In their thirteenth, fourteenth, and fifteenth year, the number of deaths never amounts to more than two. This is then the least dangerous period of life. Some learned persons have remarked, that there are more women than men who live to seventy or ninety; but that there are more men than women that go beyond ninety, and live to a hundred years. Three thousand millions of people at least might live at the same time on this earth; but there is scarce a third of that number, or at most a thousand and eighty millions; that is to say, six hundred and fifty millions in Asia, an hundred and fifty millions in Africa, an hundred and fifty millions in America, and an hundred and thirty millions in Europe. The most natural consequence to be drawn from hence is, that it proves the mercies of God, and that the life of man is precious in his sight. Is it possible that such an equality of births and deaths should be preserved, and their proportion continue so regular and constant, at all times and in all places, if Divine Wisdom had not so ordained it?

OCT. XVIII.

The Disasters incidental to Nature.

I SEE that even this beautiful nature, which in spring charmed every sense, and afforded such variety of pleasure, is subject to the laws common to all created things. Its beauty has now disappeared, and every day brings new revolutions, one more melancholy than another. But such is the

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lot of nature. It contains within itself the sources of cruel devastations. How much mischief is occasioned by the overflowing of rivers, too heavy rains, the melting of snow and ice: whole villages overflowed, fruit-trees torn up by the roots, crops of corn laid under water, flocks destroyed. All these are sad monuments of the destructive power of the elements. A shipwreck appears to be a fatal disaster, as a whole commonwealth might have been produced from the men that the sea has swallowed up. Immense sums, which required ages perhaps to collect, are lost in a moment; the very sight of the stormy sea, the lamentable cries of the dying people, the crash of the ship when it splits, what terror must it not strike! What calamities proceed also from excessive heat and long drought! The grass and the plants wither; the earth is dried up, and we are stifled with the burning sand. The waters gradually corrupt, and become a poison to the flocks. Heat and putrefaction likewise breed insects prodigiously. They destroy every thing, they devour the country; and, if they die to-day, another generation appears to-morrow. The horrid companion of death, famine, comes next, and is followed by the plague. One single bad year, a war, an infectious disorder, may cause all these evils. What confusion, what destruction, the earthquakes occasion, which become more and more common! In the very bowels of the earth pestilential vapours boil up, and a destructive fire spreads death on every side. Often, on a sudden, in the middle of the night, the earth rumbles and quakes, whole cities are overthrown, and thousands of people are swallowed up. What a formidable sight is a volcano! Nature, which in other respects is so lovely, hereby becomes terrible. At this dreadful scene, I say to myself, How imperfect is every thing but the Creator himself! Many people make Nature their God, and its

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beauties make them forget the great Being from whom they proceed. Let us learn the true state of all earthly things, and how much superior the love of God is to all that can attach us here. To find delight in the contemplation of his divine attributes, and to know our sovereign good, is the way to triumph over all the desolations of nature. What is more proper also to increase our love and gratitude, than to remember that he turns even these calamities into blessings? These apparent disorders of nature prevent evils infinitely worse, which would happen, if destructive matter, such as subterraneous fires and vapours, were to remain heaped up and confined in the bowels of the earth.

Burning heats serve to dry the earth, which is in other parts overflowed with water. Plague and famine deliver the world from a multitude of wicked people that are a burden to it; and the extraordinary mortality which sometimes happens amongst men, is a very wise means of preserving the balance, and of preventing too great population. Perhaps God would not send plagues on earth so often, if his justice and righteousness did not oblige him from time to time to punish the crimes of the wicked. When we are mere spectators of the mischiefs that happen, and not immediately interested in them, ought not our gratitude to that great Being, who has spared us, to be attended with sentiments of compassion and charity towards our unfortunate fellow-creatures? Let us never be insensible to the misfortunes of others, nor hear with indifference the calamities of people the most remote from us; as if nothing was to affect us but what related personally to us. In the immense chain of events in the world, there is not a single link to which we do not each of us belong more or less nearly. Were the unfortunate people who suffered so many miseries greater sinners than we? Why are they fallen, while we are preserved? Is the place we inhabit

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less sullied with crimes than the countries where earthquakes and volcanoes make such havoc! The final catastrophe of nature will be still in another manner terrible to us. This world is not eternal. After having successively experienced evils of every kind, the moment of its total dissolution will at last arrive. Nature still flourishes, but she visibly grows old. It is only with labour and industry that we draw from the earth what it produced of itself to our ancestors, and what they gathered almost without trouble. Let it perish then, this land of our pilgrimage, since it is designed to perish. We have no permanent abode here, but let us seek that which is to come in the kingdom of God.

To destroy and to create, such is and ever will be the work of God to the end of time. If he never destroyed, we should see no new creations. We should have no trials for resignation or patience. We should not be so sensible of the value of religion, which strengthens and consoles in the worst of calamities, and which raises us above all the evils of life. Let us then hold by this, and let this be the result of our reflections.

OCT. XIX.

The Circulation of the Blood.

OF all the movements in the animal body, there is none more important nor more mysterious than the circulation of the blood. There is something so great in this motion, that it strikes the mind, and makes us sensibly feel the limits of human knowledge, while it inspires us with the profoundest admiration for the supreme wisdom of our divine Creator. The blood circulates continually in our body. Let us trace the principle of this motion. The heart, which is placed near

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the middle of the chest, between the two lungs, is a musculous intestine, which forms two cavities, separated from each other by a partition. This machine is in continual motion; contracting and dilating by turns. From the left ventricle of the heart grows out the trunk of an artery, called the aorta, or the great artery. It soon divides into several branches, some descending, and others ascending. These numberless branches, which become smaller and finer, in proportion as they are farther removed from the heart, spread, and are dispersed over every part of the body. The right ventricle, by contracting, pushes the blood into these arteries with so much force that it reaches to the extremity of the very smallest and farthest branches. This motion is called the pulse. It is the effect of the pulsation of the heart, and is quicker or slower, according as the heart contracts with more or less quickness. But what becomes of the blood when it has reached the farthest branches of the arteries, which are spread throughout the whole body? Nature makes the wisest use of it. Certain arteries, through which the blood flows, absorb the watery parts, others the oily, and others still, the saline particles. In different parts of the body, where the arteries reach, the secretion is formed of the milk, fat, or any other humour necessary for certain purposes, or which, as useless, ought to be expelled from the body. The remainder of the blood, after being thus purged, flows into the extremities of the arteries, in such a manner that, with the help of a microscope, the little red globules may be seen very distinctly rolling one after another. But then these little channels enlarge gradually, larger vessels form, and then larger still, called veins, through which the blood is conveyed back to the heart, in the same way as it had been conveyed from it, through the arteries. These veins then bring back the blood from all parts of the body,

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above and below, into the heart, where they form a channel, through which the blood again discharges itself into the right ventricle; from thence it does not go at once into the left ventricle, but the contraction of the heart forces it into the artery which leads to the lungs, through a number of little branches. Here the blood, which has circulated through the whole body, and is heated by the friction, requires, before it begins circulating again, to be cooled by the fresh air which breathing conveys to the lungs. By means of this cooling, it thickens again, whereas it had been extremely dilated by heat during the circulation: it is afterwards taken up by the pulmonary veins, which lead it to the left auricle of the heart. This restores it to the left ventricle, which, by contracting, forces it again into the aorta; and thus it is dispersed throughout the whole body. In this manner the blood circulates, passing from the heart to the extremities of the body through the arteries, and returning back to the heart through the veins. Such is the admirable mechanism of the circulation of the blood. But the human mind cannot perfectly explain this master-piece of Divine Wisdom.—For example, is it not wonderful, that the motion of the heart should continue without interruption for seventy, eighty, or an hundred years, and that so delicate a machine should not fall to pieces, or wear out? The blood takes its course of circulation twenty-four times in an hour, and consequently 576 times in twenty-four hours; and as, at each pulsation, the heart forces two ounces of blood into the aorta, consequently it appears, that, in an hour, there pass through the heart 7,200 ounces, which is 600 pounds of blood. Must not that alone strike us with astonishment? How many other extraordinary circumstances may there be in this circulation which we are ignorant of! In a word, "Man, whose sway all

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things here below yield to, is a wonderful composition. The most admirable mechanism and bodily perfection unite in him. Every limb proclaims him lord of the creation. An innumerable number of invisible channels, formed and measured in a manner infinitely surpassing the art and skill of man, convey, disperse, and cause to flow regularly, and without interruption, this precious fluid, on which life depends. In this universal motion, in this continual flux and reflux, all is regular and well ordered; every thing is in its place, and in the most perfect harmony; nothing is discordant; nothing is in the way; nothing interrupts; nothing precipitates its course." This admirable circulation, which is observed in all animals, takes place also throughout all nature. The sun, moon, and stars, run the course prescribed them, in a regular determined motion. Not only the air is in a perpetual motion, but it circulates round the earth continually, and the water also flows without interruption. The rivers fall into the sea, and from the vast surface of the ocean rise vapours, which form into clouds. These spread again in rains, which penetrate into the mountains, fill the springs with water; which insensibly increase and become rivers; and then return again to swell the ocean. The ever-fruitful earth annually produces plants and corn, and never exhausts, because the continual circulation of nutritive juices repairs her losses, and restores to her what she had given to us.

All these revolutions of nature lead us back to a First Cause, who has so regulated the world, that every thing is continually in action. They circulate, act, and move, in an insensible labyrinth of changes, till they return to their former place, and return again to the place prescribed them.

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OCT. XX.

Proportions of different Parts of the Human Body.

GOD has formed the human body according to the wisest plan, and has observed the most exact proportion in every part of it. To be convinced of this, we need only calculate the height and breadth of the human body by a certain measure agreed upon. The height of our body is generally divided into ten equal parts, which we call *faces*, according to the terms of art; because a man's face was the first model for those measures.—The first takes in all the face, which begins at the root of the hair above the forehead. From that point, to the top of the head, there is a third of a face in height, or, which is the same thing, a length equal to that of the nose. Thus, from the crown of the head to the bottom of the chin, there is a face and a third of a face in length. Between the bottom of the chin and the hollow of the collar-bones, there are two-thirds of a face. Thus, the height from the collar-bones to the crown of the head makes twice the length of the face, which is the fifth part of the whole length of the body. From the collar-bones to the bottom of the breasts is reckoned another face. Below the breasts begins the fourth face, which ends at the navel; and the fifth makes out the half of the height of man.—The length of the thigh to the knee, is that of two faces: and the knee itself is half a face. The leg, from below the knee to the instep, is the length of two faces; which in all make up nine and a half; and from the instep to the sole of the foot, being half a face, it completes the ten faces into which the human height is divided. This is meant for the generality of men; but in those who are very tall,

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there is about half a face more between the breasts and the middle. It is this degree more of height in that part of the body, which constitutes a fine stature. When the arms are stretched out in a direct horizontal line, the distance between the extremities of the longest finger of each hand is equal to the height of the body. From the hollow between the collar-bones, to the joint which unites the shoulder-bone to the arm, there is the length of a face. When the arm hangs down, it is computed at four faces. Two from the shoulder-joint to the elbow, and two from the elbow to the beginning of the little finger, which makes out five faces for each arm: in all ten faces, which is the length of the whole body. The hand is the length of a face; the thumb is the third of one, or the length of a nose, as well as the longest toe. The length of the bottom of the foot is equal to a sixth part of the height of the whole body. There is a measure also for the thickness of the body and limbs. That of the finger is generally the thirty-sixth part of the length. The thickness of the little finger makes the forty-eighth part. The hand is three times as thick as the thumb, and the body six times as thick as the hand. The height of the human body varies considerably. The finest stature is from five feet four or five inches, to five feet eight or nine inches. Middle-size is from five feet and an inch to five feet four. Low size is under five feet. Women are generally two or three inches lower than men. Their chest is higher; so that the size of the chest is thicker in women, and broader in men, proportionably to the length of the body.

Men have more brains than any other animal of the same size; they have even more than the horse or ox. A man who weighs an hundred pounds, has generally four pounds of brains. Children born at the proper time generally weigh eight pounds at most, and five at the least. The greatest length is a foot and eleven inches, and the least is

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a foot and six inches. The human body, then, whether it be taken in the whole, or in its several parts, is formed by exact rules. All is in proportion, and in the most perfect harmony, as well as to size and form, as in respect to the disposition of the parts. There are none greater or smaller than the connection they have with the other limbs, or the general design of the whole machine require. No form or position could be imagined better adapted, or more advantageous to the limbs altogether. It is certain, however, that there may be variations and exceptions among them, which do not destroy the principal design of the body, such as monsters, and ill-shaped persons. But though certain disproportions in the size, the form, and position of the parts, may be compatible with the chief purpose of them, they still hurt the grace and beauty of the outward appearance. How grateful then should those persons be who are well made, and whose limbs are all well proportioned!

OCT. XXI.

Navigation.

TO a thinking mind, navigation is an object which may give rise to most important reflections. Here our curiosity is excited, and at the same time satisfied in several ways, so as to be a source of great pleasure. In general, we only consider the advantages which result from navigation, but we ought to consider also the mechanism and motion of ships, by which it is performed. Is it not, in the first place, very astonishing, that so enormous and heavy a mass as a ship should be made to swim on water? The weight of a ship is greater than may be imagined, and requires but little attention to comprehend, that its pressure on the water must be prodigious. A man of war, with

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a thousand men (ship's crew) must have generally three months provision for that multitude of people, and is a seventy or an hundred gun ship. Now, in supposing each man to weigh but an hundred pounds, and a gun but six stone, though there are some that weigh forty, and supposing each man to eat but three pounds weight a-day, even this moderate calculation amounts to a weight of 381,200 pounds. Still the weight of the ship itself is not taken in, with its rigging, and the quantity of materials necessary to keep up the ship and to load the guns; articles which at least equal the former in weight. Yet this enormous mass of 600,000 pounds weight is moved by a very gentle wind. Is not this inconceivable? and does it not seem contrary to the laws of nature? But it is so natural, that it would be a miracle were it otherwise. It is not the wind that moves this load. The ship swims, with all its weight, upon the water. But how such a heavy body can float, how the water, the parts of which do not hold to one another, can have force and consistency enough to support such a mass, is the question. This is an effect of equilibrium. The ship sinks, till the volume of water which it removes is equal to its own bulk. Suppose the ship 120 feet long, and fifteen broad, and that it sinks two feet deep, that is 3600 feet of water (or so much cargo), as one takes place of the other. Thus, the river is no more loaded by the ship than it was by the water it removes. Navigation was formerly much more dangerous and difficult than it is at present. They did not dare to venture far upon the open sea, but coasted along from shore to shore. But since the invention of the compass, they cross the seas more securely. Before this valuable discovery, it was a sort of wonder to make little sea voyages. In the time of Homer, it required great preparations, and much deliberation, before the heroes resolved to cross the

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Egean sea. The expedition of Jason and the Argonauts, that is to say, the passage over the Propontis and Pont Euxine, was considered as a wonderful exploit: And what was all that in comparison of our navigations? It is the discovery of the compass which has enabled us to make long voyages. The needle turning constantly to the north, informs the navigator in what region he is, and to what region he sails. In the darkest nights, in the most cloudy days, in the midst of the ocean, this instrument serves as a guide, and leads him from one end of the world to another.

Though many may not have reflected on the advantages of navigation, it is to that we owe, directly or indirectly, great part of what is necessary for our subsistence. Spices and medicaments which come from distant countries, we could not have, without an enormous expense and difficulty, if they were not brought in ships to our ports. We should be much distressed if we were obliged to bring every thing we want by land. The following calculation will prove it. A ship's burden is reckoned by tons. There are many which carry six hundred tons. A ton weighs 2000 pounds. Thus, a ship, with a burden of 600 tons, carries 1,200,000 pounds weight. Now, allowing 1000 pounds to each horse; it would require 312 carriages for four horses, at least as many men, and 1248 horses to bring over that weight. But then, how could treasures from other parts of the world be obtained? How much would even the common necessaries of life cost?

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OCT. XXII.

Beasts of Burden.

THESE sorts of animals do us so much service, and are so useful to us, that it would be ungrateful not to examine them nearly. We generally content ourselves with subduing them for our food, or to supply our want of strength; while we through indolence or ignorance, neglect to consider them as connected with the whole creation, or to reflect on the wisdom and goodness of the Creator, which appear so evidently in the production of these useful creatures. Of all domestic animals, it is the horse which does us most service, and does it the most willingly. He lets himself be employed to cultivate our ground; he brings us all our wants; he submits tamely to every sort of labour, for a frugal and moderate subsistence. He shares with us the pleasures of hunting, and the dangers of war. It is a creature which gives up its being to exist only by another's will: he even knows how to prevent it; and, by the quickness and precision of its motions, expresses it, and executes it. Giving himself up entirely to his master, refuses him nothing; makes use of all his strength, exhausts himself, and even dies in trying to do more. Nature has given the horse a propensity to love and fear mankind; and made it very sensible to the caresses which render its servitude pleasing. The horse is the best proportioned and finest shaped of all the animals. Every part of him is elegant and regular. The exact proportions of his head give him a light and lively look, which is still heightened by the beauty of his chest. His carriage is noble, his step majestic, and every limb seems to mark animation, strength, courage, and

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pride.—The ox has not the pleasing elegance of the horse; its monstrous head, its legs too thin and too short for the size of the body, the smallness of its ears, its stupid look, and heavy walk, are deformities; but it compensates for these by the important services it does to mankind. It is strong enough to carry heavy loads, and is content with poor food. Its blood, its hide, flesh, fat and horns, may be applied to several uses; and its dung is excellent manure for the ground. A very remarkable circumstance in this animal is the construction of its organs of digestion. It has four stomachs, the first of which can contain forty or fifty pounds of food. The third stomach has eighty-eight folds or ridges, which serve to digest, while sheep or goats have but thirty six. —The ass, however void of beauty in its appearance, and however despised it may be, has notwithstanding, many excellent qualities, and is very useful to us. It is not fiery and impetuous like the horse; but quiet, simple, and always the same. It has no pride. It goes smoothly on. It carries its load without noise or murmur. It is temperate, both as to the quantity and quality of its food. It is contented with thistles, and the hardest and worst herbs. It is patient, vigorous, and indefatigable; and is of continual and essential use to its master.

How is it possible that we can daily make use of these animals, without reflecting on the Creator who formed and gave them the means of being so useful to us! It is a circumstance worthy the attention of a reflecting mind, that the number of beasts of burden is infinitely greater than that of wild beasts. If the latter multiplied as fast as the former, the world would soon be a desert. Can we reflect without gratitude on the goodness of God who has given us the command of those animals; the strength or skill to subdue them; the right to make use of them; to change

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as we please their nature; to force them to obedience; and to employ them as we choose. This power is a gift from God, by which man may every instant perceive the excellence of his being. If God had not impressed animals with a natural fear of mankind, it would be impossible to subdue them by force. Since, therefore, it is to God alone we owe our power over them, we should be unpardonable to abuse it by treating those creatures ill.

OCT. XXIII.

The Winter Sowing Time.

GREAT part of the food destined for us, and for many animals, is at this time deposited in the ground. The farmer has sowed his winter corn, and begins to enjoy rest from his labours. He will soon have the satisfaction to see his fields gradually covering with a beautiful verdure, and giving the promise of a plentiful harvest. Nature at first, indeed, works in secret, while the seed is opening; but its operations may be discovered, by taking some of the grains out of the ground when they are beginning to shoot. Two days after the grain is put into the earth, it is swelled by the juices, and begins to shoot. The shoot is always at one of the ends of the grain; and that part of it which is next the outside of the grain is the little root of the future plant. The part turned inwards is the stalk and head of the plant. The corn, when sowed, generally begins in twenty-four hours to pierce through the coat, and unfold itself. The root and stalk become visible. The root is first wrapped up into a bag, which it bursts open. Some days after, other roots shoot out of their sides. The fifth or sixth day, a green stalk springs up above the ground.

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It remains some time in that state, till the fine season comes, when the ear of corn breaks out of the coats in which it had been inclosed and protected from cold and uncertain weather.

All this naturally leads us to reflect on the nature of human life. Our present existence is but the seed from whence everlasting life is to spring. We are here in the sowing season, and we see but little as yet sprung forth. We cannot here behold the fruit in maturity, or the corn in perfection. The harvest will not be reaped on earth. We live in hope. The farmer has sowed his field. He leaves his grain to corruption, to the rain, the storms, and the heat of the sun; and he sees not what will be the result. This is precisely our situation in regard to spiritual seed. Let us not be vain of what we sow, neither let us be discouraged, if we do not reap the fruits of it. Let us not be weary of "sowing to the Spirit;" and perhaps our good works, however trifling in themselves, may have happy consequences hereafter. Now, that our ground is sowed, let us wait patiently, and without anxiety, till we reap the fruits of our labour; and, like the pious farmer, let us pray to God to shed his blessings on our fields!

OCT. XXIV.

The particular Providence of God.

IT would be a great misfortune for the world if there was any foundation for the opinion of unbelievers, that God's providence is only over the world in general, for the preservation of the whole species, but not over individuals. Would such a being as the freethinkers suppose him deserve the name of a God, if he could not, or would not, interest himself in the parts of which the whole is composed? For our comfort, we are taught, both

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by reason and religion, to believe in a God whose providence extends to every individual creature. Let it not be said, that it is beneath God to attend to individuals. The whole universe, like the vilest dust, is nothing in comparison of the Supreme Being. What then can we call little or contemptible? Is there not less difference between one single man and whole nations, than there is between them and those immense globes which appear so little in the eyes of the common people? The least reflection may convince us, that, in the sight of God, to whom a thousand years are as a day, and the whole universe like a drop of water in the sea, there is nothing either great or small in itself, or any event, however inconsiderable, that is unworthy his attention. If we take the poorest plant, or the least insect that can be dissected, we shall discover in the minutest parts of them the same wisdom which shines in the construction of the whole.—The smallest fibre contributes as much to the perfection of the whole plant, as the animal or plant itself contributes to the perfection of the whole species, or the species to the perfection of the universe. But if God has vouchsafed to form these creatures which appear so despicable, why should it be beneath him to preserve them? And how could the whole be perfect, if the parts were not so; or how could a whole species be preserved, if the individuals were not regarded? Reason alone may teach us this, but revelation confirms it. We learn from thence that the hairs of our head are numbered. Even our hairs, of which we lose millions in the course of our lives, without missing them, every one of them is numbered. From thence our Saviour draws this conclusion, that with much more reason God interests himself in us, and vouchsafes to honour us with his notice. Let us then adore his providence with the most lively gratitude and faith.

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OCT. XXV.

The Measure and Division of Time.

TIME is measured and divided according to the motions of the celestial bodies, and particularly by those of the sun and moon. These two globes have the most influence on the state of mankind. The course of the moon only serves to measure the time on our earth; that of the sun certainly regulates the time in all the planets which move round it. Day is the space of time in which the sun makes a revolution round the earth; or, to speak more justly, it is the time our earth takes in turning round its own axis. The part of this time during which the sun is above the horizon, we call artificial day. This is when the light is determined by sun-set and sun-rise. The time of darkness, or when the sun is below the horizon, we call night. The day and night together make the solar day. We divide it into 24 parts, called hours. Each hour is divided into 60 equal parts, called minutes; each minute into 60 seconds; and each second into 60 thirds. This division of the day into hours, minutes, &c. is marked by the motion of the shadow on a sun-dial, or by the hand of a clock. A good sun-dial constantly marks the hour truly, but clocks or watches require to be often regulated. Most Europeans, in common life, begin their hours of the day at noon, from whence they reckon twelve to midnight, and twelve more to noon again. The Italians begin the day at sun-set, and reckon twenty-four hours from thence to the following evening. The Turks begin their day at a quarter of an hour after sun set; they reckon from thence twelve hours, and, when those are passed, they reckon twelve more to the following evening. The Jews begin the day at sun-set;

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from thence they reckon twelve equal hours to sun-rise, and as many to sun-set; consequently, their hours of day are longer or shorter than those of night, in proportion to the length of the day and night. A week is the space of seven days. A solar month is the time the sun takes in traversing a sign of the zodiac: but those months do not begin or end exactly as that body enters a new sign. The lunar month is the space of time between two new moons, that is to say, twenty-nine days, twelve hours, and forty-four minutes. The solar year takes in twelve solar months, which is the time the sun takes in traversing the twelve signs of the zodiac; and there are generally reckoned in that time, three hundred and sixty-five days, five hours, and forty minutes. These are now the years in most parts of Europe. The lunar year takes in twelve lunar months, or twelve courses of the moon round the earth. It is composed of three hundred and fifty-four days, eight hours, and forty-eight minutes. The Jews and Turks make use of this reckoning; but in order to make it answer to the solar year, they often add a whole month to it. Our common year begins ten or twelve days after the sun has entered Capricorn.

This measure or division of time, however unimportant it may appear in itself, may become of much consequence, by the moral application of it to the life of man. The hours, days, weeks, months, and years, of which our earthly life is composed, were given us in order that we should fulfil the design of our existence, by making a good use of our faculties. But how do we employ this precious time! Minutes appear to us too trifling to attend to. It is certain, however, that he who does not reckon minutes will lavish hours also. But are we even mindful of more considerable spaces of time? Alas! if, out of all the days alloted to us, we were to deduct those

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which are almost lost to us, in respect to our immortal souls, what would there be left? From this calculation may we not reckon, that a man of seventy has lost more than fifty years, and that one of fifty could scarce reckon seven which he has employed for his eternal happiness.

Merciful God! what a melancholy mortifying thought is this! How many millions of days and hours, granted us by thy fatherly goodness to make use of for our eternal welfare, have been shamefully consumed in idleness and vice, in giving way to criminal passions, and in doing injuries to our fellow-creatures! With what inconceivable rapidity does time pass away! An hour is irrecoverably lost ere we perceive it; and an hour is a great deal to a man who can easily reckon the hours of his life. "Teach us, O Lord, so to number our days, that we may apply our hearts unto wisdom."

OCT. XXVI.

The End of Summer.

THE sun is now taking leave of the world. Every thing is changed with us. The earth, which was lately so beautiful and fruitful, is now becoming gradually barren and poor. We no longer behold that fine enamel of the trees in blossom, the charms of spring, the magnificence of summer, those different tints and shades of verdure in the woods and meads, the purple grapes, nor the golden harvests which crowned our fields. The trees have lost their clothing; the pines, the elms, and oaks, bend with the force of the northern blasts. The rays of the sun are too feeble now to warm the atmosphere or earth. The fields, which have bestowed so much upon us, are at last exhausted, and promise no more this year.

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These melancholy changes must necessarily diminish our pleasures. When the earth has lost its beautiful verdure, its lively colours, its brilliancy, and in a manner all its glory, when the fields present nothing but a damp soil and gloomy colours, we lose the pleasures attending the sense of sight. When the earth is stripped of its corn, its grass, and its leaves, nothing is to be seen but a rough and rugged surface. It has no longer that beautiful appearance which the whole together, of corn, greens, and herbs, produces over a vast country. The birds no longer sing; nothing now recals to the mind of man that universal joy which reigned throughout all animated nature. Deprived of the pleasure which the melodious songs of the birds afforded, he knows nothing now but the murmuring streams and whistling winds, constantly the same dull sounds, which can only create disagreeable sensations. The fields have lost their perfume; and nothing is breathed but a sort of damp smell, which is never pleasing. A cold damp air is disagreeable to the feeling. But in the midst of these melancholy prospects, let us still observe that Nature faithfully fulfils the eternal law prescribed to her, of being useful at all times and seasons of the year. Winter draws nigh; the flowers are going; and even when the sun shines, the earth no longer appears with its usual beauty. Yet the country, stripped and desert as it is, still presents to a feeling mind the image of happiness. We may recollect, with gratitude to Heaven, that the fields which are now barren, were once covered with corn, and plentiful harvest. It is true that the orchards and gardens are now stripped; but the remembrance of what they bestowed upon us may make us content to bear the northern blasts, which at present we feel so sharp. The leaves are fallen from the fruit-trees; the grass of the field is withered; dark clouds fill the sky, and fall in heavy rains. The

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unthinking man complains at this, but the wise man beholds the earth moistened with rain, and beholds it with a sweet satisfaction. The dried leaves and the faded grass are prepared by the autumnal rains to form manure to enrich the ground. This reflection, with the pleasing expectation of spring, must naturally excite our gratitude for the tender mercies of our Creator. Though the earth has lost its beauty and exterior charms, and is exposed to the murmurs of those it has nourished and cheered, it has already begun again to labour secretly within its bosom for their future welfare. But why is not the moral world equally faithful to fulfil its destination as the natural world? The acorn always produces an oak, and the vine produces grapes; why then do not the children of a great man always resemble him! The man of learning and the artist, so useful to society, why are their descendants so often stupid and ignorant? Why do virtuous parents produce wicked and bad children? In reflecting on this difference, we may find several natural causes for it; and we may see that it must happen in the moral, as it does sometimes in the natural world. The best vine, for want of a good temperature, produces sour bad grapes, and parents, respectable for their virtues, have children that degenerate from them. In carrying my reflections farther, I look back upon myself, and say: are not my best days also clouded; and has not the splendour which surrounded me disappeared, like the leaves of trees? Perhaps our lot in this world has its seasons. If it be so, I will, in the dull winter of my life, have recourse to the provisions laid up in the days of my prosperity, and endeavour to make a good use of the fruits of my education and experience. Happy, if, at the close of life, I carry with me to the grave the merit of having been useful to society.

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OCT. XXVII.

Magnificence of God in the Works of the Creation.

"GOD has shewn himself in the creation as a Being infinitely wise." There is no creature, however insignificant it may appear, that has not its use; and all of them are formed in the manner best adapted to the purpose of their existence. This we know with certainty of those we are acquainted with, and we may conclude the same of the rest by analogy. From the sun, down to the lowest worm, or smallest plant, we shall every where find, that, for the purpose designed by the Creator, no creature could be formed otherwise than it is. The most minute parts of each creature are evidently adapted to its use, and serve for the functions prescribed them; and the whole creature would be defective, and would but imperfectly answer the purpose of its existence, if any one of its parts were hurt or taken away. How wonderful is the whole that results from the connection between all creatures in general! Each is in its place, each has its proper office; and none of these could fail, without causing an imperfection, more or less, in the whole. When, therefore, we represent to ourselves the Being who formed this innumerable multitude of creatures, animate and inanimate; who has not only designed each of them for certain purposes, but has disposed and arranged every part of them in the manner best adapted to those purposes, so that there is nothing superfluous or wanting; who has, from the connection between each individual, formed an admirable whole, in which there reigns the most perfect harmony; must we not be struck with astonishment, and cry out with respectful ad-

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miration, "O the depth of the wisdom and goodness of God!"

"In the creation God has shewn himself a Being infinitely good." What multitudes of animated creatures has his beneficent hand produced! From the beginning of the world, mankind have been endeavouring to find out all the living beings on earth, and yet there are daily discovered new species of them hitherto unknown. Is not life invaluable to every thing that breathes? Is it not a blessing to the poorest worm? What pleasure God has in doing good, appears by the number of creatures on whom he has bestowed the blessing of existence. But of what use would their existence be, if they were to be immediately deprived of it? The Creator has therefore ordained, that each should live as long as was necessary for its destination. He has appointed to each creature the place it should inhabit, and each of them finds at its birth all it requires for the preservation of its existence. Many animals are born with instinct and industry sufficient to seek their own food; others, like mankind, are at first taken care of and taught by their parents. How inexhaustibly fruitful has God made the earth, for the benefit of mankind! How long already has it afforded support for millions of men and animals! And were the world to subsist ever so long, there is no doubt it would continue to do so for all the future generations. How many enjoyments and pleasing sensations does not the Creator grant, with life, to all animated beings, and particularly to mankind! With what magnificence has he not adorned and embellished the world which man was to inhabit! What sweets does not social life afford him! What tender ties, what warm affections, what delightful sentiments, has he created for the heart to enjoy! Let us never be ungrateful to such a bountiful Creator; and since we are endowed with reason, and are capable of

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knowing and loving God, let us acknowledge, that "the earth is full of the mercies of the Lord."

"In the creation, God has shewn himself as a Being of infinite power." This unlimited power, which is visible in all creatures, is particularly so in the two extremes, in the greatest and in the most minute works of the universe. What but an almighty hand could form the firmament, that immense extent, that prodigious space, which contains such a number of celestial bodies? Who but He could preserve this immense fabric, fix it unshaken, and yet keep up so many different, though regular movements in it? What other could raise the sun to such a height, appoint its situation so as not to deviate from it, and maintain it unsupported in that vast expanse! Could any but an almighty power give motion to the earth, the moon and stars, so as to run invariably the course prescribed them, to finish and begin again their revolutions at certain appointed periods? If we consider the Divine Omnipotence in the smallest objects, we shall find it there as incomprehensible as in the largest. We need only cast our eyes on the dust under our feet: this dust is inhabited by an innumerable multitude of animals, so small, that several millions of them joined together would not be equal to a grain of sand. Yet each of these animals has its exterior and interior parts; each has its sense and feeling, each has its instinct, loves life, and endeavours to preserve it. Behold the grass of the field, the hairs of your head, the blossoms of the trees, and study their construction, their origin, and use; we shall every where discover wonders every where acknowledge the infinite power of Him who forms celestial globes with as much ease as he creates a worm, or causes a flower to grow.

Lord, how great and numerous are thy works! They are full of wisdom, and the earth is filled

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with thy blessings.—May these reflections excite in us love, respect, and confidence, towards the wisest, best, and most mighty of Beings!

OCT. XXVIII.

Laws of Inertion.

INERTION is nothing but a force of resistance, by which all bodies are disposed to remain in the state they are in. When a body is at rest, it resists the motion given to it; but when once put in motion, it persists in it from the same causes, and resists the bodies which would stop its motion, with as much force as it at first resisted the moving powers. Nothing can be wiser than this law which the Creator has established. By this means, the bodies move with perfect regularity, and the laws of motion and percussion can be exactly determined by it. If the celestial globes had not a force of resistance, they could not move with such order and regularity, but would constantly require a new motive to keep them in motion. It is an evident proof that the universe was formed and planned by Infinite Wisdom. Suppress but a little part of the immense fabric, and the whole would be out of order. Of what use to us would be the construction of plants and animals, or the admirable arrangement of the celestial globes, if those bodies were not susceptible of motion? How simple does this law appear, and yet what wonderful effects result from it! Such are all the works of the Creator. The principles are of the utmost simplicity, but the whole edifice is so much the more admirable. The universe is like a magnificent palace; the thick and rough walls on which the building rests, appear to have neither elegance nor beauty, and yet they are so indispensably necessary, that, without them, the

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least motion of the air would throw down the whole edifice. Even these foundation-walls are not totally void of beauty. One should be an architect himself, or be well acquainted with the rules of art, to be able to conceive the pleasure which the symmetry and construction of foundations may afford. None but an artist can know why these foundations are of the depth, width, and length, which the architect gave them. He sees they would not be right if they were otherwise; and by knowing how perfect the work is, he enjoys the satisfaction of being able to judge of it. This is exactly the case in contemplating the works of God. Every spectator is not capable of discovering the fundamental laws on which most of the phenomena depend, or of comprehending the wisdom of them. This knowledge is reserved for the true philosopher, and it affords him inexpressible pleasure. It seems as if there was also in the mind a certain inertion as well as in matter. Bodies which move continually the same way, and towards the same point, have a certain tendency to it. The human mind has the same propensity to acts which are often repeated in the same manner. We might make an excellent use of this natural resisting power of the soul, by making it serve to strengthen us in virtue. Nothing is necessary for this purpose, but to repeat frequently the same acts, till we become as much accustomed to good and virtuous actions, as we now are to bad ones. It is of so much the more importance, as without virtue we can never enjoy true or solid tranquillity. But from whence proceed the errors into which we so often fall in this respect? Why do we continually pursue imaginary blessings which lead us to destruction? Our hearts, seduced by the pride which is natural to us, and dazzled by the deceitful appearance of sensual things, make us enter the path of virtue with a sort of repugnance. But let not be discouraged by the

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violence we are obliged to do our inclinations and passions. The wicked themselves are often obliged to restrain theirs, in order to gain some temporal advantage, or to avoid some misfortune. And this constraint, in not yielding to their sensual desires, must be very painful to bad men. On the contrary, how sweet the satisfaction we feel, when our souls resume the command they ought always to have over the senses! A frequent exercise of this command would lead us at last to that happy state wherein the soul is in a manner raised above the tumult of passions, and beholds with pity the swarm of despicable slaves to vice.

OCT. XXIX.

The Wants of Man.

THERE is not a creature on earth that has so many wants as man. We come into the world naked, ignorant, and destitute. Nature has not endowed us with that industry, and those instincts, which the beasts have at their birth. Reason has been bestowed on us, that we should acquire the necessary knowledge and talents. In this respect other animals may appear enviable. Are they not in reality happy, to have no occasion for the dress, the defence, and conveniences, which we cannot dispense with; and not be obliged to invent, or put in use such a multitude of arts and trades, as these several necessaries require? They bring with them, at their birth, clothes, arms, and all they want, or they have those natural instincts, which, by following blindly, procure it for them. If they require habitations, they know how to dig or build them; if they want beds, covering, or change of clothes, they know how to spin and weave them, and get rid of their old ones; if they

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have enemies, they are provided with arms to defend themselves; if they are sick, or wounded, they know where to find proper remedies. And we, who are so superior to other animals, have more wants, and fewer means of supplying them, than they have. It may be asked, why the Creator has, in these respects, given the brute creation the advantage over mankind? And this curiosity is very excusable, if it is not attended with complaints. By subjecting man to more wants, God designed to exercise that reason with which we were endowed, to render us happy, and which supplies all the resources of other animals. By not having their instinct to assist our many bodily wants, we are obliged to make use of our reason, in order to acquire a knowledge of the world, and of ourselves. It is necessary to be active, vigilant, and laborious, to preserve us from poverty, pain, and vexation, and in order to make our lives pleasant and happy. Reason is, at the same time, the only means to subdue our strong passions, and to prevent us from running into excesses of pleasure, which might be fatal to us. A few examples may convince us of this. If we could obtain, without any trouble, all our food, &c. we should certainly become indolent and idle, and we should pass our lives in shameful sloth. The noblest faculties of man would weaken and grow dull. The bonds of society would be broken, because we should no longer depend on one another. Even children would be able to do without the assistance of their parents, and still less would they want it from others. All human kind would fall again into a state of barbarity. Wild and savage, every one would live, like the brutes, for themselves only. There would be no subordination, no mutual obligations or good offices. It is then, to our wants that we owe the opening of our faculties, and the prerogatives of humanity. They awaken the mind, create activity and industry,

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and make our lives more easy and pleasant than those of other animals. Our wants have made us sociable, rational, and regular in our manners; they have given rise to a multitude of useful arts and sciences. In general, an active and laborious life is beneficial and necessary to man. If his faculties and powers are not exercised, he becomes a load to himself, he falls gradually into a stupid ignorance, into gross excesses, and all the vices resulting from them. Labour, on the contrary, sets all the machine into a pleasing motion, and gives so much the more satisfaction and enjoyment, as it requires the more industry, reflection, understanding, and knowledge. If, after having been fed with our mother's milk, we required no assistance or instruction, we should only live for ourselves, we should centre all in self; learning no language, we should make no use of our reason; stupid and profoundly ignorant, we should neither be acquainted with the arts nor sciences, nor the noblest pleasures of the soul: whereas, now, the wants of children, the destitute state in which they come into the world, oblige the parents, through pity and tenderness, to take care of them; whilst the children, on their parts, are attached to their parents, by a sense of their own helpless state and danger, and submit to be guided and formed by their instruction and example, how to make a proper use of their reason, and to respect morality. Thus they may become worthy men, good citizens, and lead a virtuous and happy life. With such advantages, we may easily give up those which the animals appear to have over us. We require neither furs nor feathers to clothe us, no teeth, or claws, to defend us, neither more cunning or natural instinct to procure us necessaries. Such gifts of nature would only degrade or reduce us to a mere animal state of perfection. Our senses, our reason, and our hands, are sufficient

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to procure us clothes, arms, food, and all we require for safety, support, or pleasure, and enable us to enjoy all the treasures which nature bestows. We find, then, that these wants, of which so many complain, are the true foundations of our happiness, and the best means which Divine Wisdom and Goodness could make use of, in order to direct the faculties of man to the greatest advantage. If we were wise enough to employ them according to these views, we should spare ourselves much misery. There would scarce be one in an hundred, amongst the unhappy, who could attribute his distresses to fortune: and we should confess that there is much more good than evil in the world; that our evils are softened by a thousand advantages; and that it is in our power, not only to lead a tolerable, but even a happy life.

OCT. XXX.

Of Presentiment.

THE faculty of the soul, in foreseeing future events, appears in such extraordinary ways, that we cannot but be struck with it. The sensations and representations which produce a presentiment are sometimes so obscure and wrapped up in the mind, that we are not conscious of them. The mind, however, draws very exact consequences from them, and the image of the future presents itself clearly enough to convince the mind of it. It then forms conjectures and presages, without knowing what led it to do so, and in its astonishment takes them for inspirations. This is what we call presentiment, when, without being able to account for our foreseeing some future event, we have an idea more or less clear of it. But it must here be observed, that presentiments are, by their nature, much fainter representations than sensa-

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tions, therefore they cannot be distinguished well when the senses and a warm imagination put the mind into a violent agitation. But as soon as the soul is calm, the presentiments are more distinct; and this is the reason that they happen generally in the silence of night, in sleep, or in dreams. Man is then sometimes raised above himself; the veil is drawn between him and futurity; and he speaks of future events, while he is scarce able to see what passes before his eyes.

A number of facts prove beyond a doubt, that the soul has sometimes this faculty of foreseeing the future. One must be little versed in the knowledge of nature, to deny a thing only because it appears extraordinary, and that we cannot explain it. This secret emotion, which sometimes warns us of what is to happen, really exists in the bottom of our souls; and history is full of so many examples of this nature, that it is impossible to deny them all. There are few people who have not experienced some of them. The soul is a representative power of the universe, in respect to the place it occupies in it. It has the faculty of representing the past as well as the present; why may it not, in the same manner, represent the future, and even future contingencies? It may use the same means for this purpose, as it did in respect to the past. Provided it has been informed of past events, it can perceive them as if present; and why should we consider it as impossible that it should be informed also of future events? There are in the universe millions of spirits superior to man, which might reveal to him some part of futurity; or there may be in the human mind some power, hitherto unknown, which may enable it to foresee remote events.

But however obscure and inexplicable the causes of presentiments may be, it is enough for us to know that they may contribute directly or indirectly to our happiness. Sometimes they warn

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us of danger, sometimes they foretel some pleasing and happy event. In either case, these warnings may be useful to us. We are only to take care that this faculty of the soul, instead of being a torment to us, may serve to confirm and increase our tranquillity. We must particularly guard against superstition. We must not too much trust to presentiments, so as to depend rashly upon them, or allow them to make us neglect our duties, or forget that it is in God alone we ought to put our whole trust and confidence.

OCT. XXXI.

The Heavens declare the Glory of God.

IF we wander in the paths of error and vice, it is certainly not for want of warning or instruction; for whosoever is so disposed may find continual opportunities for both. There is scarce any thing in the universe that is not calculated to inform or correct us. Every thing combines to give us an high idea of the God we adore. Every thing tells us the respect and obedience we owe him. All his creatures declare his power, his wisdom, and glory, in a language very intelligible to those who attend to it. The heavens in particular, and all the heavenly host, the sun, that great principle of fecundity and life, with eloquence proclaim, and loudly celebrate, their divine Creator. These are objects truly worthy the observation of a rational being; and yet they seldom occupy our thoughts. Man, in a state of nature, could have no other guide in the searching for his God, but what he drew from beholding the works of nature, and particularly the structure of the heavens; yet from these alone all nations formed this natural consequence, that there was a God. "When we behold the heavens (says Cicero),

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when we contemplate the celestial bodies, can we fail of conviction? Must we not acknowledge that there is a Divinity, a perfect Being, a ruling Intelligence which governs, a God who is every where, and directs all by his power? Any body who can doubt this, may as well deny there is a sun that lights us....Time, (says he, in another place), time destroys all false opinions, but it confirms those formed from nature. For this reason, with us, as well as with other nations, the worship of the gods, and the holy exercises of religion, increase and grow purer every day." This proves the effect which the contemplation of the heavenly bodies had at all times upon mankind. The royal psalmist, therefore, might well speak of the heavens as having voice and language, for they forced all nations to acknowledge them the work of a supreme Being. "The heavens declare the glory of God." There are two ways of considering the heavens and the firmament; the one general and superficial, the other more particular, and with attention. The first is common to all who are endowed with sight. They need only look up and behold the starry sky, with all its beauty and magnificence. The labourer in the field is witness to this admirable scene; and every day he hears the language of the heavens. Though he cannot know the wonderful construction of this firmament, which so attracts his sight, nor is able to make philosophical observations upon it, yet it may lead him to ask, "What power has formed this vast, this splendid sky? If it be solid, who is the architect! What hand suspended all those luminous bodies at several distances from it? and who directs them to move in regular courses?" Good sense alone would give rise to these questions; and the same good sense would be sufficient to resolve them. But (if one may dare to use the expression) the heavens have, in later ages, been forced to speak a still more intelli-

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gible language. There has been extorted from them new demonstrations of the glory of God. In the first place, the immense expanse astonishes and confounds the imagination. Formerly our idea of it was much more confined. But now that, by comparing our earth to the stars, we have found it to be one of the smallest globes in the universe, and that the heavens contain millions much greater, judge what a space it requires to admit such a number of bodies, among which this sublunary world is but as a speck, so as to make their revolutions, without interfering, or hitting against one another. What idea does even this first observation give us of God's infinite power! How can we reflect on those vast regions, without admiring the Being who fills them by his immensity, and whose power extends to the remotest parts of the universe. Secondly, The innumerable bodies this great expanse contains, some of which shine with their own light, others only by a borrowed one. Without deciding any opinion in respect to the fixed stars being suns to light other worlds, or not, it is enough for us to know that God has not made any thing in vain; and consequently all these bodies, both luminous and opaque, are designed for purposes worthy his wisdom. New ones are every day discovered, which had before escaped our limited sight; and of course were not created for us only, as was formerly imagined. The works of the Creator are found to be so numerous, and in such variety, that it would be the height of human pride to suppose our earth the principal, to which all the rest belong. Thirdly, The prodigious, and yet well ordered distance of the celestial bodies, joined to their reciprocal and regular effect upon one another at that distance, is a third source of admiration. If the universe had been the work of chance, if it had not even been formed by the wisest, as well as most mighty of Beings, there

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would have been confusion and irregularity in the plan; but He who measures infinite space with the palm of his hand, placed each globe in the only situation proper for it. The celestial bodies never interrupt each other's course, nor prevent the mutual effects of any. In a word, the most perfect harmony subsists between them. If we were only to consider that assemblage which we call our vortex, we should never behold all the globes of which it is composed, beginning and ending their course at certain fixed and regular periods, without ever varying. Thou knowest it, O man. God causes the sun to rise each day. He dispenses the seasons. In the expectation of these vicissitudes, thou art never deceived. What but a God could preside over so many wonders? Fourthly, In the motion also of the earth and celestial bodies, considered simply as mere motion, I find demonstration of the existence and unlimited power of the Deity. In fact, as all these vast bodies do move, they must necessarily have been determined to do it by some being, by a *first motive*. They are by nature inanimate bodies: and not having in themselves the principle of action, they must have received it from a superior power. Besides, theirs are not motions directed by chance; they are constant, regular, and periodical, another sign consequently of a divine hand. Lastly, Light and heat are two things which we absolutely cannot dispense with, and which we enjoy in proportion to our want of them. Plunged in eternal darkness, this world would have been a melancholy prison to us. Deprived of those rays which give life and fruitfulness to all the productions of nature, we should have been chilled with continual frost. One sun alone has power to animate and quicken the whole earth. In the day it lights us, and then gives place to the dark veil of night. During part of the year it draws near us, in order to produce and ripen the fruits which nourish us. During the other part,

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it removes from us, to give time to the earth to rest. Were it nearer to us, it would set us on fire; were it farther from us, we should perish with cold. What compass is it that has measured so exactly? What supplies this globe of fire, so that none of its substance is wasted, but remains entire and unconsumed?

How forcibly does all declare the Divine Almighty Power!

NOVEMBER I.

Creatures that live in the Sea.

WE should at first have some difficulty in believing that there could be living creatures in the sea. It contains so many different sorts of plants, herbs, trees, and bushes, which so mix and twine together, that it seems as if the ways must be impassable, and that there could be nothing but disorder and confusion in this savage place: And yet, strange as it may appear at first sight, nothing is more true, than that there are living creatures in the sea, all connected with one another. It is not a few individuals only that the sea contains, but such a number of different species, that we are far from knowing them all, much less can we say how many individuals belong to each species. In the midst of this innumerable multitude of animated beings there is no confusion; they are easy to be distinguished; and there reigns the same order in the sea as elsewhere. All those creatures may be ranked in certain classes; they have their particular and distinct nature, food, way of life, character, and instincts. There is there, as upon land, gradations, shades, and insensible steps from one species to another. The one begins where the other ends. The stone which is the highest among the minerals, is half of it a plant; the plant, which

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terminates the vegetable kingdom, belongs partly to the animal; and the brute, which forms the link between man and beast, has some conformity with man. So likewise in the sea, Nature goes gradually from small to great; each species rises insensibly to perfection; and the whole are connected by one immense chain, in which no link is wanting. What a prodigious multitude of inhabitants does the sea contain! What variety amongst them, in their forms, their instincts, and destination! Some are so small they are scarcely visible; others are so large, that one is frightened at the sight of such enormous masses. There are some totally without any ornament, and so like the sea in colour, that they can scarcely be distinguished from it: Nature has adorned others with the most lively and beautiful colours. Some species of them multiply very little, as they would otherwise destroy and devour all the others; some, on the contrary, are wonderfully prolific, in order to serve as food for men and animals.

"O Lord! how manifold are thy works! in wisdom hast Thou formed them all."

NOV. II.

The Wisdom of God in the Connection between all the different Parts of Nature.

AS all the members of the human body together form one whole, which is constructed and planned with infinite wisdom; so also the different species of natural productions are so many members of which the Supreme Wisdom has composed one perfect whole. It requires but a little attention to be convinced that every thing in nature is linked together. It is evident that the several sorts of mineral earths nourish and preserve the vegetables, without which the animals could not subsist. Fire,

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water, and air, are indispensibly necessary for the preservation of this terrestrial world. This forms an indissolable bond between all the things of which our globe is composed; and it has been demonstrated by naturalists, that this globe itself has necessary connections with the sun, the planets, and all the creation. But what less than boundless wisdom could combine together such infinite multitudes of different substances, and form them into one? What but that could link together so many millions of different creatures, in such a manner that they could serve for the subsistence of each other. That we may not be lost in this immense ocean, the creation, let us only dwell on the subject of our globe, which makes so small a part of it. Let us at present only reflect on what we have before our eyes, and examine the animal kingdom in respect to its connection with the rest of nature; and if we consider the wants common to all animals, we cannot avoid being struck with the admirable harmony there is visible in it. Warmth, air, water, light, all these things are indispensibly necessary for the preservation of all creatures.—But there must be a just proportion of them. For too much or too little would be equally hurtful, and would turn nature into a chaos. A degree more in the universal heat would destroy every living creature. For, if our earth, taken in the whole, should receive more of the sun's heat, the summer, in every climate, must consequently be hotter than it is at present. Experience tells us, that in all countries the heats are sometimes so great, that if they were to increase, or to last longer, men and animals would die, and the plants would wither and perish. On the other hand, if we had less heat, it would be as bad, since, even as it is, the cold is sometimes so severe, that animals are in danger of being frozen, and do often die of cold. The earth then receives the precise degree of the sun's heat which is proper for all creatures, and

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any other would be fatal. There is the same just proportion in the air. The rising of the vapours depends chiefly on the weight of the air, and the rain on its lightness. Now, if the air was not to condense and to rarify by turns, and become sometimes heavier and sometimes lighter, we should not have the variety of temperature so necesary for the vegetation of plants, and consequently for the support of animals. If the air was in general heavier than it is, it would be more loaded with vapour, clouds, and fogs, and from thence it would be wet, unwholesome, and hurtful to plants and animals. If, on the contrary, it was lighter, the vapours could not rise, nor collect into clouds. It is the same in every thing. Nature always observes a proper medium: and as all the elements are regulated in the manner best adapted for the preservation of animals, so are they in perfect harmony with all other natural things. The air not only produces those variations of temperature which are so essential, but is also the origin of sound. It has been appropriated to our ear; and here, again, appears an admirable wisdom.—For if the air was more or less elastic, if it was more or less thick, the ear would suffer by it greatly. The soft and pleasing voice of man would resemble claps of thunder, or the hissing of serpents. The air contributes also to the circulation of the blood; it penetrates into the very smallest veins. If it was thicker, its force would break every thing; if it was thinner, it would act too feebly. There are a thousand other connections, that different beings have with the air, and yet it has all the properties which each requires. Now, if we consider that many millions of species of plants and animals have all of them occasion for air, heat, and light; that each species differs from another, and has its particular constitution; that it is weaker or stronger than another; and yet that the elements agree equally with all, and supply

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their different wants; shall we not acknowledge that a boundless wisdom, to which nothing is difficult, must have formed this admirable connection and harmony between so many different beings? In a word, every thing in nature is formed by exact rules, and designed for certain purposes. Not only the trees which rise so majestically, the plants so varied, the fertile meadow, the horse so useful to us, the flocks which feed us, the mines which supply us with ornaments and riches, the sea which furnishes our tables with exquisite fish, and conveys us from one region to another, the stars which shed their influence on our globe; not only these brilliant parts of the creation, but even the very moss, the little shell-fish and insects, contribute to the perfection of the whole.

Almighty Being! Creator and Preserver of all things! can we contemplate these objects without thinking of Thee, and admiring thy wisdom?—Without Thee, all would be in darkness, confusion, and disorder. There would be neither connection, harmony, nor pleasure upon earth.

NOV. III.

Bed.

PERHAPS we are not so sensible as we ought to be of the comfort of a bed in summer, but now that the cold increases every day, we begin to know the value of this blessing. If we were deprived of it in these cold nights, the perspiration would be stopped, our health would suffer, and our sleep would neither be so sweet nor refreshing. In this respect, bed is a considerable benefit to us. But from whence comes the warmth we find in it? We should be mistaken, if we supposed it to be the bed which warms us: so far from communicating heat to us, it is from us that it receives

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it. It only prevents the heat, which evaporates from our body, from being wasted in the air. It confines and concenters it. We should feel this blessing more sensibly, if we considered how many creatures must concur to procure it for us. How many animals furnish us with hair and feathers for the purpose? Supposing a common bed to contain thirty-six pounds of feathers, and that a goose should have but half a pound on its body, the spoils of seventy-two geese would be necessary for one single bed. And then, how many hands and materials does it not require? It is by these sorts of calculations that we learn to know the value of God's blessings. We are apt, in general, to reflect very superficially on the gifts he bestows upon us; but if we examined into them more minutely, we should see them in a very different light. Let us reflect, then, on the several parts of which a bed is composed, and we shall be astonished to find that it requires the work of ten persons, at least that it costs the lives of as many animals; that the fields must furnish flax for the sheets and blankets; the forests supply the wood, &c. We may make the same reflections on the most common daily blessings. Our linen, clothes, bread, and drink, in a word, all the necessaries of life, none can be obtained but by the concurrence and labour of many persons. Can we then lie down in bed, without grateful sentiments? We have a thousand reasons, in the course of the day, to be thankful to God; but this alone would be sufficient. What sweet repose, what relief, after the fatigues of the day, do we find in bed! In these cold nights, there is no warmth, not even with great fires, equally good as that of bed. It gives us, at little expence, warmth and rest. Let us then be thankful whenever we lie down to sleep, and remember how valuable a blessing it is. We ought to be the more so, as there are but too many of our fellow-creatures who cannot find rest in their

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beds, or who have no beds to lie on. How much are they to be pitied! How many are there exposed, in open air, to the inclemency of the weather, travelling by sea or land! How many in prison, or in poor huts, sighing for beds! It is probable that an hundredth part of the inhabitants of every town are in some one of these situations. How happy are we in comparison! How many of our fellow-creatures, who are up all night for us! the soldier on duty, the sailor at sea, &c. But there are still more, who, though they have beds, cannot sleep. Within a very small circle, there are but too many sick, who are prevented from sleep by pain; others kept awake by affliction: sinners by remorse of conscience; and unhappy people, whose secret troubles, poverty, and anxieties for the morrow, do not permit them to taste repose. What is then our duty in respect to them? If it is not in our power to relieve them otherwise, let us at least bestow our pity and our prayers upon them. When we go to bed, let us pray for those who have no beds, or who cannot enjoy them. Let us pray for those who are deprived of sleep, by grief, poverty, or pain. Let us afterwards reflect on our own bed of sickness and death. We shall not always sleep as soundly as we do at present. There will come nights, when we shall bathe our beds with tears, when the agonies of death will come upon us; but they will soon be followed by a sweet repose and quiet sleep. We shall sleep in the grave, and awaken with renewed strength to behold the face of God. Let us, in the days of our health and prosperity, think of this last bed which the earth will give us, and let us think of it with consolation and joy.

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NOV. IV.

Reflections on the Summer which has just passed.

THE fine days are gone; and, except the pleasing remembrance of having enjoyed them, there remains nothing now but emblems of frailty. How the whole face of nature is changed! The rays of the sun fall faintly through dark clouds upon gardens stripped of flowers; on fields where there are scarce any traces of harvest, and on hills where no verdure is seen. The air no longer resounds with the melody of birds, the dull silence which reigns is only interrupted by the croaking of ravens, and the screams of the birds of passage taking leave of us, to seek more temperate climates. The neighbouring hills are become desert; they are no longer covered with flocks of sheep, nor enlivened by their bleating. How gloomy and melancholy the appearance of the whole country, once so cheerful! Instead of the beautiful verdure, which was its chief ornament, it now offers nothing to the sight but a dead yellowish hue. The clouds are full of chilling rain; and thick clouds veil from us the serenity of morning. Such are the prospects which nature now presents. Who can behold them without reflecting on the instability of all earthly things! The fine days are in a manner flown; and while we are preparing to enjoy them, they disappear and are gone. But have we a right to murmur at the dispensations of the Lord? No, certainly; we should rather recollect the summer days, with the innocent pleasures they afforded, and bless the Ruler of the world for them. What sweet sensations they create! With what pure joy the soul is filled in contemplating the beauties of nature, when the mountains and valleys grow green before our eyes, and when the lark soaring in the

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bright clouds, and the nightingale in the shady grove, both warble their sweet song? When the flowers perfume the air around us; when the morning dawn sheds universal gladness: or when the setting sun tinges our woods and hills with the finest glow, what happiness does the enjoyment of nature in full beauty afford us! What rich gifts do the gardens, fields, and orchards, bestow upon us, exclusive of the pleasures they offer to the senses and imagination! Can we reflect on the months that are past without a sweet emotion, and without blessing the Parent of nature, who has crowned the year with his mercies. We are now living upon the productions of summer and autumn. We have observed how active Nature has been during these fine seasons, in fulfilling the Creator's beneficent views in favour of man. How many plants and flowers have sprung up in spring! and how plentiful has the autumn harvest been! The earth has now fulfilled its design for this year, and is going to rest for a time. Thus Nature is continually active during many months; and even its present rest is not useless; it is silently preparing a new creation. Let us ask ourselves, if we have been equally active; have we so employed our time as to be able to shew the fruits of it? The farmer now counts his sheaves: ought we not to count our virtues and good works?—Have the pleasures of the summer made us better, or more grateful? Have we raised our hearts towards God in the contemplation of nature? What have our employments been in the long summer-days? Have we done good to our fellow-creatures? In beholding the sun, the flowers, and so many delightful objects, have we experienced the sentiments which this magnificent scene ought naturally to inspire? Are we conscious that this summer, like many others, has not been thrown away upon us?

Let us be grateful that we still exist upon earth, but let us reflect also that this may be our last

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summer; and, knowing that we shall be accountable for all those that we pass, let us from henceforth try to redeem the time we have lost.

NOV. V.

The Inconvenience of Night.

AT this season every night grows longer, and it cannot be denied that this is, in some respects, disagreeable. For, though part of the night is designed to refresh and strenghten us by sleep, this very refreshment which we require, points to us the weakness and decay of our nature. This is the reason that at night all labour is interrupted, not only by the want of light, but also from the necessity of repose, and from the animal strength and spirits being exhausted. It is therefore natural that the hours of night should appear long and tedious, when we are restless, and cannot sleep. With what impatience does the sick man count the hours, and wish for sun-rise! Another inconvenience of night is, that we are exposed to lose our way, or meet disasters. When the shades of night are spread over the heavens, we no longer see where we walk; we are every moment stopped, and make false steps. How many travellers lose their way, and get into bad roads, among briars and brambles, into marshes and bogs, and fall down precipices, and are killed! We are also exposed to be attacked in the night, either at home or abroad, by wicked people; for darkness is favourable to all sorts of crimes. Another inconvenience is, that the nights are cold; for when the sun is set, and its rays are gone down, half the globe is deprived of their enlivening warmth, as well as their light; and this renders the long winter nights very disagreeable. Let us add also, that night continually reminds us of death. There

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is neither constant day nor night upon earth; and though the time of darkness in winter is long, and that even in summer the days are regularly divided by darkness, it is however certain, that God has bestowed more light than darkness upon the earth, by means of twilight, and by the light of the moon and stars.

Blessed be the Lord for the light of the moon and the stars, for the rays of the sun, and the splendour of noon-day. But, above all, blessed be his name for the light which his gospel has spread in the midst of error, ignorance, and misery. Let us remember, in our darkest nights, in our hours of sorrow and adversity, that we are advancing towards the regions of light and joy. If sleep sometimes forsakes us in the midst of darkness, if sickness, or care, forces us to reckon the melancholy hours, let us comfort ourselves with the reflection, that we are not hopelessly buried in eternal night, but that we are drawing nigh to an heavenly kingdom, towards that blessed habitation where there will be no change from light to darkness, neither sickness, sorrow, nor care.

NOV. VI.

Reflections on Woods and Forests.

THE woods form the finest picture which the surface of the earth presents to us. It is true, that at first sight it is a wild sort of beauty. One only sees a heap of trees, and a dull solitude. But to a well-informed mind, which thinks everything beautiful that is good and useful, there will appear a thousand objects in them worthy attention. They are the more interesting at this season, as the fields and countries are no longer so pleasant as in summer. Nothing invites us more to re-

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flect on the grandeur and beauty of nature, than a solitary wood. The pleasing shade and still silence we enjoy, lead us to collect our thoughts, and awaken the imagination. The number and variety of the trees are the first objects which attract our eyes. They are less distinguished by their difference of height than by their different stems, forms, and leaves. The resinous pine does not excel in the beauty of its leaves. They are narrow and pointed, but they last a long time like the fir, and they preserve their verdure in winter. The foliage of the linden tree, the ash, and the beech, is much more beautiful and varied. Their green is admirable; it relieves and charms the sight. The broad indented leaves of some of these trees form a fine contrast with the narrow fibrous leaves of others. We have but an imperfect knowledge of their manner of multiplying, and the use of their fruit. How numberless the ways in which wood is useful! The slow growing oak, the leaves of which are later than any other tree, affords the hardest and strongest wood; which art has taught the carpenter, joiner, and carver, to work into a variety of useful forms, so durable as to seem to defy time. Lighter wood serves for other purposes; and, as it is in more plenty, and grows quicker, it is also of more general use. It is to the forest trees we owe our houses, ships, and fuel, with many conveniencies for furniture. It is our chief and most natural fuel, to dress our food and keep us warm, as well as for other necessaries of life. The industry of man has taught him to polish, shape, turn, carve, and form wood into a multitude of things, equally elegant and solid. Divine Wisdom has dispersed woods and forests in more or less abundance all over the earth. In some countries they are at great distances; in others they take up several leagues of ground, and raise their majestic heads to the clouds. The scarcity of wood in certain countries is compen-

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sated by its abundance in others. Neither the constant use made of it so lavishly by mankind, nor the ravages of accidental fires, nor severe winters, have yet exhausted these rich gifts of nature; for even a few scattered trees, an humble copse, produce a forest in the short space of twenty years.—Is not the power and goodness of God visible in all this? How superior is his wisdom! If we had assisted at the creation, possibly we should have made many objections to woods and forests; we might have preferred orchards and fertile fields. But the infinitely wise Being foresaw the several wants of his creatures in their different situations. It is precisely in countries where the cold is most severe, and where there is most occasion for shipping, that there is most wood. From the unequal distribution, there results a considerable branch of commerce and intercourse amongst men. God intended these advantages to men when he created forests. He vouchsafed to think of us before we could feel our wants, or were able to express them. He anticipated all of them. Grant, O heavenly Father, that we may be as sensible as we ought of so many blessings, and pay the tribute of gratitude, love, and praise, so justly due to thee. It is not left to the care of man to plant or keep up forests. Most other things are obtained only by labour. The ground must be ploughed, and seeds must be sown. It costs the farmer much trouble and labour, but God has reserved to himself the trees of the forests. It is he who plants and preserves them, and men have little share in them. They grow and multiply independent of our care. They repair their losses continually by new shoots, and there is always enough to supply our wants. To be convinced of this, we need only cast our eye on the seed of the linden-tree, the maple, and elm. From these little seeds springs up those vast bodies which raise their heads to the very

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clouds. It is Thou, alone, Almighty Lord! that fixest and maintainest them during ages against the force of winds and tempests. It is Thou that sendest dew and rain sufficient to make them annually renew their verdure, and, in some measure, to keep up a kind of immortality amongst them. The earth forms not the forests which it bears; nor does it, properly speaking, nourish them.—The verdure, the blossoms, and seeds, with which the trees are every year covered, the sap which is continually wasting, are losses which would in time exhaust the earth, if it furnished matter for it; as of itself it is a heavy, dry, barren mass, that draws elsewhere the juices and nourishment with which the plants are supplied. The principles, then, of their growth, do not proceed from the earth. The air, without our aid, furnishes abundance of salt, oil, fire, and every substance the trees require.

O man! thou art overloaded with blessings. Lift up thine eyes towards the great Being, who takes pleasure in doing good unto thee. The forests are heralds of his bounty, and thou must be guilty of much ingratitude, if thou art insensible to this blessing, of which every moment may remind thee.

NOV. VII.

The Sense of Feeling.

IT may be said, with truth, that the touch is the universal sense of animals. It is the foundation of all other sensations; for there can be neither sight, hearing, smell, nor taste, without contact. But as the touch operates differently in the sight from what it does in the hearing, and in the hearing, different from the other organs of sensation, we may, in this respect, distinguish the sense

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of feeling from that universal sensation above mentioned. They are both produced by the interposition of nerves. The anatomists reckon ten pair of principal nerves. They are a kind of strings or threads, which originate from the brain, and spread through every part of the body to the very extremities. Wherever there are nerves, there are sensations; and wherever the seat is of any sense, there also are these nerves, which are the general organs of feeling. There are optic nerves, auditory nerves, olfactory nerves, and nerves for the touch, which, like the sense of feeling, are spread throughout the whole body; they proceed out of the spinal marrow, pass through the side orifices of the back-bones, and thus disperse through all the parts. These are also in the parts which serve as organs to all the senses; because, independent of their own particular sensation, they must also be susceptible of feeling. This is the reason that the eyes, ears, nose, and mouth, receive impressions which depend entirely on the touch, and are not produced by their own particular nerves. That the feeling is occasioned by the interposition of nerves, is certain; for each member feels more strongly in proportion to the number of its nerves; and the feeling ceases where there are no nerves, or when the nerves have been cut out. Incisions may be made in the fat, one may cut off bones, cut the hair and nails, without giving pain. The bone is surrounded with a nervous membrane; and the nails are fastened in a place interwoven with nerves; and it is only when some of these are hurt that pain is felt. Therefore, properly speaking, we should not say we have the tooth-ach, for the tooth being a bone, can have no sensibility; but the nerve may occacasion pain when it is irritated.

Let us here admire the wisdom and goodness of God. In dispensing the sense of feeling throughout the whole body, he evidently ordained it for

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our good. The other senses are placed in the parts best adapted for the use of them, and for their preservation. Now, as it was necessary for the security and welfare of the body, that each of its parts should be warned of whatever might be useful or hurtful, agreeable or disagreeable to it, the sense of feeling was spread over the whole body for that purpose. It is another effect of Divine Wisdom, that many species of animals have a quicker sense of feeling than ours; for it is necessary to their kind of life, and compensates them for the want of some other senses. How exquisite must the sense of feeling be in a spider, when, in the midst of the web it so curiously spins itself up in, it perceives the smallest motion which the approach of other insects may occasion! But without dwelling on the feeling of animals, it will sufficiently excite our admiration to reflect upon this sense in mankind. How can the nerves, which appear to us to be only susceptible of more or less thickness or length, more or less tension or vibration, how can they transmit so many different sorts of ideas and sensations to the soul? Can there be such a correspondence between the body and soul, that nerves of a certain construction should produce certain sensations! Has each organ of sense, nerves so ordered, so analogous to the corpuscles, to the little particles of matter which issue from these bodies, that the impressions they receive from thence should always be followed by certain fixed feelings? It seems, at least, as if there was probability in this conjecture, from the pyramidical form of the papillary nerves. But our knowledge is too limited to decide this point; and we must humbly acknowledge that it is one of those mysteries of nature which it is not permitted us to penetrate. Let us give thanks to God, that amongst the other senses with which we are endowed, he has granted us that of feeling. How many enjoyments should we be deprived of, if we

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had less sensibility? We could neither distinguish what is beneficial, or avoid what is hurtful to us. Would that our souls had as lively a sense of what is great and good, as our bodies have of pleasure! This moral sense was impressed upon our souls. Though it is much weakened, grant, O Lord! that it may never be effaced.

NOV. VIII.

A Remembrance of the Blessings the Spring and Summer afforded us.

The Original is in Verse.

COME, O my friends, let us acknowledge the goodness of the Creator. Let us gratefully recal time we have passed in the fulness of joy, when, free from cares or anxiety, the renewal of nature filled us with delight; when devotion followed us to the bower, and when the very shadow of sorrow was banished our habitations; when, hand in hand we sought the flowery paths in pursuit of the Creator, whom we found on every side. From the thick bush, where the foliage drew the songsters of the air, we hear their melodious notes. Friendship, harmony, and innocent mirth, combined to render our pleasures still more sweet. Smiling nature lavishing her flowers upon us, we breathed the balsamic odour of roses. The pink and the gillyflower perfumed the air around us; and, towards the evening of a fine day, the playful zephyrs wafted sweets to us on their light wings. Then were our souls filled with mild delight: our lips opened in thanksgiving to the Lord, and our voices mixed with the songs of the birds. Often, when the breath of the wind has cooled the burning heat of the air, and the birds felt animated with new life; when the clouds were all dispersed, and

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the great luminary promised to be favourable to us, pleasure gave us wings; we cheerfully forsook the noise of cities, to seek the green shades, Nature's bowers. There we were undisturbed; and wisdom, piety, joy, and innocence, attended us to the rural asylum. The trees waving with the evening breeze, while they covered us with their shade, conveyed the most refreshing coolness to us, and nature drew forth rich sources of content to pour into our pure hearts. There, entirely given up to the Creator, to nature, and to reflections on our happiness, tears of sensibility filled our eyes. The songs of joy, which resounded on every side, accustomed our hearts to grateful gladness. The cheerful bleatings of the well-fed flocks heard from afar; the pleasing sound of the shepherd's pipe; the busy hum of the bees fluttering round the flowers; even the hoarse croaking of the frogs, basking themselves on the banks of the rivulet; every thing gave us impressions of pleasure; every thing raised us gradually to our Creator. His supreme wisdom was visible to us, in the waters, the air, the beasts, the insects, and the very perfume of the flowers. The most cheerful prospect presented itself to us; such as the happy scenes in which our first parents lived. At a distance we perceived large and ancient woods, and hills gilded by the rays of the sun; the agreeable mixture of various colours; the rural flowers; the golden harvest; rich grass plots, enamelled by the hand of Nature; the treasures of the field; the pasture of the herds and flocks, who yield to us their wholesome milk; the food of man, not yet unfolded from the green corn. Must not all these objects excite every feeling heart to glorify the Creator, and to celebrate his goodness? Here Nature displays to us all the majesty of its Author. This magnificent universe is too beautiful to be the abode of unthinking man, of man who can un-

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feelingly behold it. It is for him that the wings of the wind waft their refreshing breezes; it is for him that the silver stream murmurs at the hour of noon, when he rests from his labours; for him that the corn ripens, and the trees bear fruit. The whole creation serves him, and he deigns not to observe it. Those who love God will discover in the zephyr, in the rivulet, in the meads and flowers, in the blade of grass, and the ear of corn, traces of his eternal wisdom, and, throughout all nature, heralds of his power. The God who created the angel, gave being also to each grain of sand. It is through him that the mite and the elephant equally exist. At the sight of a blade of grass, as at an aloe, the thinking mind is alike raised to its Creator; as the muscle, no less than the whale, proves the greatness of the Lord. Are not his powers as great in the breeze of the zephyr, as in the storm; in a drop of water, as in the ocean; in a spark of fire, as in millions of stars?

NOV. IX.

Foreign Animals.

EVERY part of the world has animals of its own; and it is for very wise purposes that the Creator has placed them in one country, rather than in another. The most remarkable animals in the southern countries are the elephant and camel. They surpass all the quadrupeds in size. The elephant, in particular, appears like a moving mountain, and its bones are like pillars. Its head is joined to a very short neck, and armed with two tusks strong enough to tear up trees, or throw them down. A longer neck could not support the weight of the head, nor hold it up. But to make amends for the short neck, his trunk

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is very long. He uses it as a hand to convey food to his mouth without being obliged to stoop for it. He not only moves, bends, and turns it all ways, to do whatever we do with our fingers, but he makes use of it as an organ of smell; and this animal may be said to have his nose in his hand. His eyes are small in proportion to the size of his body, but they are bright and full of fire. All his inward feelings are expressed in them. In a state of independence, before the elephant is tamed, it is neither sanguinary nor fierce. It is of a mild nature, and never makes use of its weapons but in its own defence. It never hurts any body unprovoked, but it becomes terrible when irritated. It seizes its enemy with its trunk, flings it like a stone at him, and then treads him to death. The elephant eats above 100 pounds of grass a-day; but its body being of an enormous weight, it crushes and destroys with its feet ten times more than it consumes in food. Its chief enemy, and often its conqueror, is the rhinoceros, an animal very like the wild boar, that makes use of the horn which grows upon his nose to pierce the belly of the elephant. It requires very little attention to perceive the wisdom of God in the production of the elephant. He has ordained that it should be born in countries abounding with grass; and that it should not become a burden to the earth by multiplying too fast, the female bears her young for two years, and does not begin to encrease again till the third year. The camel is one of the most useful animals in the east. It is admirably adapted to bear the greatest fatigues in the midst of barren deserts and burning [illegible]ds; being able sometimes to live four or five days without drink, and requiring but very little food in proportion to its size. It browses the few plants and shrubs that grow in the deserts; and when he finds none, two measures of beans and barley serve for

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a whole day's subsistence. Besides the hump which grows on its back, there is still another singularity in its make. This is a double throat, one of which reaches to the stomach, and the other terminates in a bag, which serves him as a reservoir to keep water in. It remains there without corrupting; and when the animal is pressed by thirst, and has occasion to dilute its dry food, it draws into its paunch part of this water, which moistens the throat, and goes afterwards into the stomach. The common load a camel bears is from 700 to 800 pounds weight; and with this burden they go two German leagues and an half in an hour; and they generally travel twelve or fifteen hours a-day. The fleshy foot of the camel is made to walk on sand, while the horny hoof of the horse would be hurt or burnt by it.

The most remarkable quadrupeds in the northern countries are the elk, the sable, and the rein-deer. The first of these animals is large, strong, and finely shaped. Its head something resembles the mule in form, size and colour. Its legs are long and strong; its hair of a light grey. This animal is simple, stupid, and timorous. It finds food every where; but it prefers bark, or the tender shoots of the willow, the birch, or the service tree. It is extremely swift, and, having long legs, goes a great way in a very short time. The sable wanders in the forests of Siberia, and is much sought on account of its beautiful fur. The hunting of this animal is generally the sad occupation of the wretches who are banished to those deserts. The rein-deer is an animal of a most elegant pleasing form, very like a stag. It seeks its own food, which consists of moss, grass, leaves, and buds or shoots of trees. The northern nations draw many uses from them. They eat their flesh, drink their milk, and are drawn by them in sledges, with extreme swiftness, upon the

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ice and snow. All the wealth of the Laplanders consists in their rein-deer. The skin furnishes them with clothes, beds, and tents, in a word, with all the necessaries of life.

What has been said of these foreign beasts may give rise to important reflections. How prodigious the distance between the elephant and the mite! And what wonderful variety is there in the exterior form of animals, their shape, their organs, their senses, motion, manner of multiplying, &c.! and yet every thing in them is perfectly adapted and proportioned to the kind of life ordained them. In many parts of the world, there are animals which could not bear the climate, air, food, or degree of heat they would find in Europe; neither can it be doubted but there are millions of animals which could not exist on our globe, and could no more live amongst us, than we could live in the planet of Saturn, or that of Mercury.

NOV. X.

Variety of Winds.

THERE are great variety of winds. In some places they are fixed the whole year, and blow always from the same point. In others, they change at certain periods of time, but still by fixed and regular laws. At sea, between the tropics, and some degrees below them, there is a wind which lasts the whole year, without any considerable variation. On the north of the line, the wind blows towards the north-east; and on the south of the line, it blows towards the south-east, more or less, according to the position of the sun. This must be understood to mean the wind at open sea; for, if islands or great continents are opposed to it, the direction may be changed

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to north-east. In the southern parts of the ocean, the wind is generally westerly. The nearer to the coast, the more changeable is the wind, and still more so on land. The constant east-wind is chiefly owing to the heat which the sun communicates to our atmosphere. In the Indian seas, there are winds, called trade-winds, or monsoons, which blow for three or six months of the year from one point, and for the same space of time from the contrary point. These winds have not yet been well accounted for; but certainly we must look for the causes of them in the changes from heat to cold, the position of the sun, the nature of the soil, meteors taking fire, vapours dissolving into rain, and other such circumstances. There are seas and countries which have winds and calms peculiar to them. In Egypt, and in the Persian Gulf, there is, during summer, a burning wind, which suffocates and consumes every thing. At the Cape of Good Hope, there forms a cloud sometimes, which is called the fatal wind, or the ox-eye. It is at first very small, but visibly increases, and soon produces a furious tempest, which swallows up ships, and plunges them into the deep.—Variable winds, which have no fixed direction or duration, blow over the greatest part of the globe. It is true, that some certain winds may blow more frequently in one place than in another; but it is not at any regular time that they either begin or end. They vary in proportion to the several causes which interrupt the equilibrium of the air; heat, cold, rain, fair weather, mountains, and even the straits, capes, and promontories, may contribute very much to interrupt their course, or change their direction. There are many other causes certainly, though not yet known to us, for the different modifications and turns of the wind. One thing particularly remarkable is, what happens every day, and almost in every place, a little before sun-rise: when the air is perfectly calm and se-

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rene at the dawn of day, there comes a quick easterly breeze, at the approach of the sun, which continues some time after it rises. The causes of this must be, that the air being heated by the rising sun, rarifies, and, by its dilating, sends the contiguous air towards the west; this necessarily produces an east wind, which we cease afterwards to feel, as the air grows warmer. From the same cause, the easterly wind must not only precede the sun always in the torrid zone, but be much stronger also than in our countries, because the sun acts more moderately upon us than it does near the line. In the torrid zone the wind blows constantly from east to west. A westerly wind is very rarely felt there.

We may observe, then, that the winds are not the effect of chance, to which no cause can be assigned. In this, as in every thing else, the Creator shews his wisdom and goodness. He has so ordained, that the winds should rise from time to time, and that there should be but very seldom an absolute calm. He regulates the motion, force, and duration of the winds, and prescribes the direction in which they are to blow. Even their being variable is a benefit to us. When a long drought causes animals and plants to grow faint and languid, a sea-wind sends clouds, loaded with vapours, to moisten the ground, and revive all nature. When this is done, there comes a dry easterly wind, to restore the serenity of the air, and to give us fine weather. The north wind clears away a great quantity of icy particles, and carries off the noxious vapours of autumn. To the sharp north wind, succeeds the southerly wind, which fills the air with an enlivening warmth: and to these continual changes of the wind we owe our health, and the fertility of the earth. Who can make these reflections without adoring God? All the elements are at his command. At his word the storms and tempests roar; they rush from sea

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to sea, from land to land; and at his command all is calm again. Should we not, therefore, put our whole trust in him? He who directs the winds as he pleases, will he not guide our ways? Whilst at his command all the changes of the winds combine for the good of his creatures, may we not believe that the vicissitudes of life contribute to the real happiness of each individual.

NOV. XI.

Hunting.

HUNTING is one of the chief amusements of a certain order of people at this season; but it is to be wished they did not set such value upon it; for the power man has over animals, and the pleasure he takes in subduing them, is too often mingled with cruelty. Sometimes, it is true, there is a necessity that animals should be put to death, in order to make the use of them for which they were designed, or to prevent an increase that would be hurtful to us: but, even then, their death ought to be made as easy as possible; and unfortunately this law prescribed by nature is little attended to by sportsmen. Men, in this respect, shew themselves more cruel tyrants than the fiercest beast. Is not the way of hunting a hare or stag dreadful to every feeling heart? Can it be an innocent pleasure to pursue with rage and fury a poor animal, which flies from us in violent anguish, till at last, exhausted with terror and fatigue, it falls and expires in horrid convulsions? Is it in humanity not to be affected with such a sight, nor to feel compassion at it? To purchase a pleasure, by the death of an innocent creature, is purchasing it too dearly. It is a dangerous pleasure, if it makes barbarity familiar to us. It is impossible that the heart of a man, passionately

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fond of hunting; should not insensibly lose the sweet feelings of humanity. Such a man soon becomes cruel and barbarous; he finds pleasure in none but scenes of horror and destruction; and, having accustomed himself to be insensible toward animals, he soon becomes so towards his fellow-creatures. Hunting does not appear to me in general an occupation which we can reconcile with the duties we are called upon to fulfil. Without mentioning the loss of time, a loss in itself of consequence, it is certain that hunting dissipates too much, and fills the mind with ideas incompatible with serious employments. Gentler amusements are more proper to unbend and divert the mind, than those tumultuous pleasures which do not leave us the use of reflection. Hunting must even appear a dangerous employment to a moral and religious man; for ought we not to be afraid of a pleasure which leads to sins and irregularities? How does the health suffer by such a violent exercise, and the sudden transitions from heat to cold! What excesses, what swearing, what cruelties, are allowed! How are the horses, dogs, and even the men treated! What mischief done to the meadows and fields! Can all these be called trifles not worth attending to? If we were wise, we should seek pleasures more innocent and pure, and we should certainly find them. We have only to look around us, and we may everywhere discover pleasing objects, such as might afford us the sweetest enjoyments. The sky, the earth, the arts and sciences, our senses, the intercourse of friends; in a word, almost every thing around us, invites us to happy employments. Why then should we run after gross pleasures, which always leave remorse and disgust behind them? We have within ourselves an abundant source of enjoyments,—a number of intellectual and moral faculties, the culture of which may every moment afford the greatest satisfaction. But it is in this that the

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great knowledge of a Christian philosopher consists: he has the art of being happy without much preparation or trouble, and particularly without being so at the expence of his virtue.

NOV. XII.

Dreams.

OUR souls are not so totally inactive in our sleep, as to leave our faculties absolutely unemployed. We have ideas, and our imagination is at work. This is the case when we dream. However, the soul has but little share in them, except as to memory; and this faculty belongs less to the rational than to the animal soul. If we reflect upon our dreams, and examine why they are generally so irregular and unconnected, and why the events they represent are so odd, we shall find that it chiefly proceeds from our being more affected by sensations than by perceptions. They represent to us persons we have never seen, or who have long been dead. They appear alive, and we associate them with things actually existing. If the soul acted in our dreams, as it does when we are awake, one moment would set these confused and unconnected ideas right. But in general the soul does no more than receive and follow the images which are presented to it. And though the objects appear very strongly, they are almost constantly oddly associated, and have no coherency. The sensations succeed one another, without the souls combining or putting them in order. It is then sensations only, and not notions, which we have; for the latter can only be when the soul compares the sensations, and operates upon the ideas which the senses convey to it. Thus, the dreams are formed only in the lower region of the soul, or in its inferior faculties. They are

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not produced by its native force, and only belong to the animal memory. It is singular, that we seldom fancy in our dreams that we hear any thing; we only think we see. It is still more extraordinary, that the images we see are perfectly like: and that every object is naturally represented. It seems as if none but the soul of a painter could draw such true and regular pictures; and yet they are performed in dreams by those who know nothing of that art. Fine landscapes, which we have never seen with any attention, present themselves to us in dreams, as true and exact as if done by the best artist. As to the accidental causes of dreams, by which former sensations are renewed, without the assistance of any actual and present impression, we must observe, that in a sound sleep we never dream, because all the sensations are extinguished; all their organs are inaccessible; every thing sleeps, the internal as well as external senses. But the internal sense, which first goes to sleep, is also the first to waken, because it is more lively and active, and is perhaps more easily moved than the exterior senses. Sleep is then more imperfect and less sound; and consequently it is the time for dreams. Former sensations, particularly those on which we have not reflected, are renewed. The internal senses, which, by the inactivity of the exterior senses, cannot be taken up with present impressions, are employed with, and operate upon the preceding sensations. It acts most upon those which have most strongly affected us; and this is the reason that dreams are generally either frightful or singularly pleasing. There is another circumstance worth observation, in regard to dreams: it is, that they mark the character of a man. From the phantoms which fill his imagination in the night, we may judge whether he is virtuous or not. A cruel man continues to be so in his sleep, as the philanthropist preserves his mild and benevolent

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disposition also. It is true, however, that an impure and wicked dream may be occasioned by the state of the body, or by exterior and accidental circumstances. But our conduct, when we awake, shews whether these sort of dreams ought to be imputed to us. We need only attend to the judgment we then form of them. A good man is not indifferent about his dreams. If he has deviated from the rules of justice and virtue in his sleep, he is sorry for it when he awakes. It is certain, that a mind which falls asleep with a sense of the grace of God, seldom fails of what may be called heavenly ideas in his dreams. But sleep is not the only time in which our minds are disturbed with odd and fantastic images. How many persons are there who dream awake! Some form high ideas of themselves, because they have been raised by fortune or the favour of princes. Others make their happiness consist in the pride of fame, and feed on the chimerical hope of immortality. Intoxicated with passions, and with vain hopes, they dream that they are happy; but this false and frail felicity vanishes like a morning dream. persons of this character have been well described by the prophet: "They resemble a hungry man, who dreameth, and behold he eateth, but he awaketh and his soul is empty; or as a thirsty man dreameth, and behold he drinketh; but he awaketh, and behold he is faint, and his soul hath appetite."

Let us never seek happiness in vain phantoms and idle dreams. Let us learn wisdom, and aspire to none but solid and lasting blessings.

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NOV. XIII.

Every thing throughout the whole Universe is connected together, and combines for the Preservation of the Creatures in it.

EVERY thing which the beneficent Creator has produced upon our globe is admirably connected, one with the other, so as to contribute to their mutual preservation. The earth itself, and its rocks, minerals, and fossils, owe their origin and continuance to the elements. The trees, plants, herbs, grass, moss, in a word, all the vegetables, draw their subsistence from the earth, whilst the animals, in their turn, feed upon the vegetables. The earth gives nourishment to the plant, the plant is food for the insect, the insect for the bird, the bird for wild beasts; and, in their turn, the wild beasts become the prey of the vulture, the vulture of the insect, the insect of the plant, and the plant of the earth. Even man, who turns all these things to his own use, becomes himself their prey. Such is the circle in which all things here take their course. Thus, all beings were created for one another. Nothing was created merely for itself. Tygers, lynxes, bears, ermines, foxes, and other animals, provide us with furs to cover us. Dogs pursue the stag and the hare, to furnish our tables: their share of the prey is very small. The terrier drives the rabbit from its deepest recesses into our snares. The horse, the elephant, and the camel, are trained to carry burdens, and the ox to draw the plough. The cow gives us milk, the sheep its wool. The rein-deer makes the sledges fly over snow and ice. The sow and porcupine rake in the earth, and the moles stir it up, that the seed of plants and herbs, being dispersed, may the more easily pro-

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pagate. The hawk serves us in fowling, and the hen gives us eggs. The cock wakes us early in the morn; and the lark amuses us with its song in the day-time. The whistling note of the blackbird is heard from morn to evening: and the melodious warbling of the nightingale charms us in the night. The stately plumage of the peacock gives pleasure to the sight. The very fish come from the depths of the ocean, venture upon the coast, and go up rivers, in order to furnish plenty of provision for men, birds, and wild beasts. The silk-worm spins its precious web to clothe us. The bees collect with care the honey we find so delicious. The sea continually throws upon its shores multitudes of craw-fish, lobsters, oysters, and all sorts of shell-fish, for our use. The jack-a-lantern, or great fly of Surinam, shines in the midst of darkness, to give light to the inhabitants of those countries. If we observe the different occupations of mankind, we shall find that they also tend to this same end which nature purposed. The sailor braves the dangers of seas and storms to convey merchandises, which do not belong to him, to their destined place. The soldier sacrifices his life to his country, and the good of his fellow-citizens. The lawyer is only employed for others. Sovereigns and magistrates, who are at the head of government, devote their time and powers to the public. Parents hoard up wealth for their children. The ploughman sows and reaps grain, which he consumes but little of himself. Thus, we do not live for ourselves only; for the wise Author of Nature has so ordained that all beings should become useful to one another. Let us learn from thence our mutual duties. The strong should assist the weak; the informed man should assist with his advice those who want it; the learned should instruct the ignorant; in a word, we should love our neighbour as ourselves, and thus fulfil the designs of the Creator. The mutual offices men

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owe to one another have made them form into societies. What divided forces could not accomplish, is easily performed by united strength. Nobody could erect a fine building or palace, without assistance. One person alone could not lay the foundation, dig the cellars, make and burn the bricks, raise the walls, put on the roof, make the windows, decorate the apartments, &c.; but all this is done with ease when the different workmen assist one another. Such is the constant law of nature, that in all the arts and sciences, nothing fine or excellent can be accomplished without the concurrence of several persons. How many millions of men does it not require to make a monarch powerful, an empire happy, a nation famous or flourishing! In all this, how great does the wisdom of the Creator appear! In order that the inhabitants of our globe, and particularly that mankind might be happy, he formed such relations and connections between all beings, that they could not subsist without each other. Experience daily teaches us that he had our good in view. The whole world was planned for this purpose, and every part of it concurs towards the felicity of mankind. Even the things which appear to us of so little importance, that we scarce deign to look at them, they all contribute to make us happy. The very insects we so much despise are useful to us. Millions of hands labour daily for us. How many animals lose their lives to support ours! and in how many other ways, of which we are ignorant, may not nature be active in our favour! May it teach us to value as we ought the goodness of our merciful Father, and to be sensible of our own happiness!

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NOV. XIV.

Common Salt.

THE seasoning most in use, and that which the rich or poor, the king or the beggar, can least dispense with, is the common salt. Its flavour is so pleasing, and it has such excellent properties for digestion, that it may be considered as one of the most valuable gifts which nature has bestowed upon us. It is given to us in different ways. Those who live near the sea receive it from thence. They dig marshes on the sea-shore, which are called salt-marshes, and plaster them with clay. The sea flows into them when it is rough, and the waves high. The water that remains in the marshes soon evaporates with the heat of the sun, and the salt is left at bottom in great abundance. Nature also produces salt springs, fountains, and lakes. In order to extract the salt out of them, the water is boiled in great cauldrons. In other places, the salt is found in solid masses in the mountains. The most famous mines are those of Catalonia and Poland. These different kinds of salt are all alike as to their chief properties. Experience has taught us, that salt dissolves in the stomach and bowels; that it has a power of digesting, prevents putrefaction, and too great a fermentation of our food. For this reason it is taken inwardly, to promote digestion, to rectify crudities in the stomach, loss of appetite, and costiveness. It not only dissolves the phlegm, which takes away the appetite, and prevents digestion, but it is also a good stimulus for the stomach, the nerves of which it gently irritates, and promotes all its operations. Common salt, therefore, proves to be perhaps the best digestive in nature. The other salts are too strong, and too disagreeable to

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the taste, for the purpose of mixing with our food. But the common salt acts gently, assists digestion, and prevents the putrefaction to which almost all eatables are liable.—Salt is therefore a particular blessing, which we do not set a proper value on, though we daily enjoy it. If we attended more to our daily blessings, how much gratitude towards God would it excite in us. Most of our food would be insipid and tasteless without salt; yet this is the least of its advantages, as we have observed the great use it is of to us in respect to health. Another circumstance in regard to salt will appear interesting to every observer of the works of nature: the smallest grain of common salt seems cut into eight angles, or with six sides, like a die; from whence most masses of this sort of salt must be of a square or cubical form. In this again the Divine Hand is visible, which has given to salt an invariable form, that has been such from the beginning of the world. This form, constantly the same, and so exact, is a very striking proof that it does not owe its original to a blind chance, but to the will of an intelligent Being. This thought is too important, and too necessary to our peace, not to make use of every occasion to recollect and impress it more and more upon our minds.

NOV. XV.

Origin of Fountains and Springs.

ALL the great rivers are formed by the union of lesser rivers, and those owe their rise to the rivulets which run into them, and the rivulets to the springs and fountains. There can be no doubt of this. But from whence do the springs come? Water, from its weight and fluidity, always fills the lowest parts of the surface of the earth: from

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whence then can the water come, which flows so constantly from the highest regions?—In the first place, it is certain that the rain, the snow, and, in general, all the vapours which fall from the air, furnish a great part of the water which flows from springs; consequently, rivers and springs are very rare in the deserts of Arabia, or in parts of Africa where it never rains. These waters penetrate down into the earth, till they find beds of white clay, which stop them as they cannot get through them. There they accumulate and become fountains, or they collect in cavities, which afterwards overflow, and the water gradually gets out through a thousand crevices, great and small, still falling towards the bottom, to which its weight naturally inclines it. Thus the water continually flows, and makes itself subterraneous currents, with which other currents mix, and by their union form what is called a vein of water. It is, however, very probable, that, in some countries at least, the springs do not owe their origin entirely to the waters which fall from the atmosphere; for there are on several high mountains considerable springs and lakes, which do not seem as if they could be produced entirely by snow or rain. There are many springs which give an equal quantity of water at all seasons and even more sometimes in the hottest and driest weather than when damp and rainy. There must, of course, be other causes both for the rise and supply of springs. Many of them are produced by vapours which are carried up into the atmosphere, and driven by the wind towards the mountains, or, by the power of universal attraction, are drawn towards those great masses. The atmosphere is more or less full of watery vapours, which, being driven and pressed against hard and cold rocks, condense immediately into drops, and thus swell the springs.

However, we must still allow that all the springs cannot be owing to this cause. For must not the

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Danube, the Rhine, and other great rivers which come from high mountains, dry up when these enormous masses in winter are covered with snow and ice? Certainly there must be caverns, which, by a communication with the sea or lakes, contribute to form springs. The sea-water having gone through subterraneous channels into these great cavities, it rises in vapours through a number of crevices, and forms into drops, which falling again with their own weight, take sometimes quite another course, because water cannot always penetrate where the vapours do. Perhaps, also, the sea-water, particularly in countries near the main ocean, may filter through the ground, and produce springs. These springs generally taste like the water from whence they flow. But those upon high mountains cannot proceed from the same cause, because the sea-water cannot rise so high; and if it could, it would not be so sweet or fit for drink. All the causes here pointed out contribute more or less to the forming of springs: and there may be other causes unknown to us. It is true that nature is always simple in its operations; but this simplicity does not consist in making use of one cause only for each particular effect. It consists in making use of as few as possible, which does not prevent there being always several auxiliary causes which concur in working the effect which nature purposes.

NOV. XVI.

The Hair of the Head.

IF we consider the wonderful construction of the hair of our heads, we shall find it worthy of attention, and discover in it evident traces of the divine power and wisdom. In each entire hair we distinguish an oblong fine thread, and a knot which

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is generally thicker, but always more transparent than the rest. The thread is the body of the hair, and the knot is the root. The long and principal hairs of the head have their root, and even a part of the thread, inclosed in a little case formed by a small membrane. The size of this is in proportion to the size of the root, always large enough to leave a little space between the root and the case. The root has two parts, the exterior and the interior; the exterior is a pellicle composed of little flakes; the interior is a glutinous fluid, where some slender fibres meet: this is the marrow of the root. From the exterior part of the root, there grow five, and sometimes (though very seldom) six little white threads, extremely fine, transparent, hard, and often twice as long as the root. Besides these threads, there grow here and there other little knots, but they are viscous, and easily dissolved by heat. From the inside of the root grows the body of the hair. It is composed of three parts; the exterior case, the inward tube, and the marrow. When the hair is come to the pore of the skin, through which it is to pass, it is very much wrapped up in the pellicle of the root, which then forms a very small tube. The hair pushes out the epidermis before it, which serves as a sheath to guard it at first, while it is still soft and tender. The rest of the envelope, or coat of the whole hair, is of a particular substance; it is transparent; and more so towards the point. In a young hair, the coat is soft; but it becomes afterwards so hard, and so elastic, that it shrinks back with some noise when it is cutting. This exterior coat preserves the hair a long time. Immediately under it, there are several small fibres, which extend the whole length of the hair from the root to the point. They are joined together, and to the point, by several elastic threads. And this collection of fibres forms a tube filled with two substances, one fluid, and the other solid; which both

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together form the marrow of the hair. An attentive observer of God's works will acknowledge the Divine Wisdom in the admirable construction of the hair, as well as in all other parts of the human body. There is nothing in the formation of man, from the crown of the head to the sole of the foot, that does not shew the perfection of the Creator. Even those parts which appear of least importance, and which seem the most easy to be dispensed with, become of consequence, when considered as connected with the other members of the body, or when their admirable construction and design is enquired into. This we may particularly observe in respect to our hair. How many people are there, who consider it as an object not worth attention, and do not discover in it any traces of the wisdom and goodness of God! But, besides that in general there is no part of our bodies useless or without design, it is very easy to know the wise purposes for which hair was given to us. In the first place, it is evident that they contribute much to the beauty and ornament of the face; but that is perhaps their smallest use. Do they not evidently preserve the head from cold and damp, so as to keep the brain in its natural state of warmth? —They certainly also promote a gentle insensible evacuation of bodily humours by perspiration; and they relieve the head and other noble parts from the superfluous moisture which might collect there. How many other uses may they not have which are hitherto unknown to us? But let us content ourselves with having been informed of some of the purposes which God hath proposed to himself. They will afford us sufficient subjects to acknowledge and adore the power, the wisdom, and goodness of our great Creator!

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NOV. XVII.

System of the Universe.

HITHERTO we have only been considering the earth, this globe, which is but a speck, in comparison of the immense universe. Let us now raise our thoughts to those innumerable worlds, at the sight of which this spot, that we and millions of other creatures inhabit, will appear as nothing.—Let us examine, reflect, and adore. The sun, which gives life to every thing, is almost in the centre of the system; and, without changing place, it turns round its own axis, from east to west, in twenty-seven days and twelve hours. All the planets, from Mercury to Saturn, move round the sun, in an oblong orbit or ellipsis. Mercury, which of all the globes is nearest to the sun, performs its revolution in near eighty-eight days, but at so small a distance from the sun, that it is generally concealed in its rays, so as to be invisible to us. Venus describes a larger ellipsis, and finishes her course in little more than 224 days. The earth requires a year to perform its revolution; and, in this annual journey, it is attended by the moon. Mars finishes his course in 687 days; Jupiter, with his four moons, in twelve years, or thereabouts; Saturn moves, with his five satellites, round the solar circle, in the space of thirty years. And, lastly, the Georgium Sidus, with his two satellites (already discovered, and it is probable he has many more), which, of all the planets known to us, is farthest from the sun, in about eighty-two years. But are those the bounds of the universe? No, certainly; far beyond the Georgium Sidus, is the region of fixed stars, of which the nearest to us is 27,400 times farther from the earth than the sun is; though this is,

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when at its greatest distance, 23,000 semi-diameters of the earth. How many globes also may there be in the great space between Saturn and the fixed stars, that are not visible to us! But is it possible that the sun, which we daily behold traversing the sky in twelve hours, should remain fixed in the centre of the world? Do we not in the morning see it in the east, and in the evening in the west? Could the earth move round the sun without our perceiving it? This objection founded on the illusion of our senses, is of no weight. Do we perceive the motion of a boat, in sailing upon a river? and, when we are in a boat or carriage, does it not seem as if every thing round us moved, and as if all the objects went back out of their place, though in reality they never move? However our senses may be deceived in this respect, our reason forces us to acknowledge the truth and wisdom of the system which supports the motion of the earth. Nature always acts in the shortest, easiest, and simplest ways. By the single revolution of the earth round the sun, we can account for the different appearances of the planets, their periodical motion, their situations, their direct and their retrograde motions. And is it not much more natural and easy, that the earth should turn round its axis in twenty-four hours, than that such great bodies as the sun and planets should move round the earth in that space of time. One undeniable proof of the sun, and not the earth, being in the centre of the system, is, that the motions and distances of the planets depend upon the sun, and not upon the earth. If it was otherwise, where would be the harmony and perfect conformity which is now so evident in all the works of the Creator? According to our hypothesis, each planet has the same motion we attribute to our earth.

These reflections on the system of the universe are calculated to give us the highest idea of our

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adorable Creator, and to make us sensible of our own insignificance. With what pleasure our mind passes from one idea to another, till it is lost in the contemplation of those great objects! With what profound veneration and admiration does it feel the greatness of its God. It is true, that the limits of the human understanding will not permit us to have an exact and perfect knowledge of the system of this world; but we know enough to be convinced, that the whole is planned with infinite wisdom and goodness, and that no system could be formed more beautiful, more worthy of the Supreme Being, or more beneficial to the inhabitants of the different globes.

NOV. XVIII.

Lobsters.

IF lobsters were of no value to us as food, they would still be worth our attention. The females of this crustaceous fish undergo a great change some weeks before this time of year. They throw off their old shells, and get new ones. This is called their moulting. It is in this manner that all crustaceous animals grow. The body of the lobster continuing to increase, while its shell remains unalterably the same, the animal becomes too large for its habitation, and is obliged to force its way out, which is a very painful operation. At the same time that they change their shell, they change their stomach and intestines. The animal, while it is moulting, seems to feed upon its former stomach, which wastes by degrees, and is replaced with a new one. The little round white stones, improperly called crabs' eyes, begin to form when the stomach is consuming, and are afterwards inclosed in the new one, where they continually diminish in size, till at last they entirely

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disappear. It is probable that the animal makes use of them as a remedy for the disorders of its stomach; or perhaps this matter has a petrifying quality, proper for forming a new shell. Except at the time of moulting, the lobsters keep at the bottom of the water near the shore. In winter they prefer the deep parts of the water; but in summer they draw near the shore, if the want of food does not oblige them to go deeper down into the water. That they might catch their prey more easily, nature has given them several claws and legs. Sometimes they have claws as large as both head and body; and what is still more singular, they have the faculty of producing new claws and horns when they have been broken off. They can even get rid of them when they become inconvenient to them. The lobsters perform this operation in any posture, but they do it more easily if they are thrown on their backs, and if, with strong iron pincers, the shell is broken, and the flesh bruised at the third or fourth joint of the claw. Soon as the wound is made, the lobster, in its pain, shakes its claw about till it falls from the body. As soon as the claw is broken, there comes a glutinous substance over the wound, which stops the bleeding. If this was removed, the animal would lose all its blood, and perish. This substance envelopes what we may call the shoot of the new limb, which at first appears only an excrescence, or a little cone. By degrees, this cone lengthens into the form of a claw, and becomes as perfect as the old one. These animals grow pregnant about autumn, as may be seen (if they are opened at that season) in the form of red clots, which gradually disappear. Afterwards, underneath the tail is filled with little round eggs, like hemp-seed, fastened by small fibres together. The first eggs appear in December, and soon increase to hundreds. They enlarge by degrees, as the weather grows warm; and before midsum-

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mer there are little live lobsters found amongst the eggs, the size of an ant, which stick to the fibres under the tail, where they remain brooding till all the eggs are hatched. They afterwards loosen from their mother, and cling to the fibres of some roots of trees which they find in the water near the shore, where they remain protected till they are large and strong enough to venture into the sea. The lobster is certainly one of the most extraordinary creatures that exist: an animal whose skin is a shell, and which it casts off every year to clothe itself with new armour: an animal whose flesh is in its tail and legs, and whose hair is in the inside of its breast; whose stomach is in its head; and which is changed every year for a new one; and which new one begins by consuming the old one: an animal which carries its eggs within its body till they become fruitful, and then carries them outwardly under its tail: an animal which can throw off its legs when they become troublesome, and can replace them with others: And, lastly, an animal whose eyes are placed in long moving horns. So singular a creature will long remain a mystery to the human mind. It affords new subject, however, to acknowledge and adore the power and wisdom of the Creator.

NOV. XIX.

The proper and convenient Situation of all Parts of the Human Body.

IF we examine the human body with any attention, we cannot but observe that all the parts of which it is composed are placed in the manner best adapted for their several uses. The wisdom of the Creator has allotted to each member its proper place; and, in the formation of our bo-

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dies, he has not only attended to our wants and conveniencies, but to ornament and beauty. In the first place, with respect to our wants, it is evident that all the parts are placed in the manner most convenient to the body. It was intended to be a machine, which was to move of itself by the powers given to it, without requiring to be moved by any exterior force. It was necessary that our limbs should perform with ease and promptness the will of our mind. All the bones are joined together; but, in order that we should make use of our limbs without difficulty, to stretch or draw in an arm, to stoop or rise as we please, the bones are divided into joints, and each bone is rounded at the end, and set within the spherical cavity of another bone, where it moves with ease, because it is covered with a smooth polished gristle, and moistened with an oily humour, which prevents the gristle from rubbing. How wonderful is it, that these bones should be so firmly set, as not to slip or separate from each other, though the feet bear so great a burden, and the hands are sometimes obliged to lift weights of an hundred pounds. In placing the parts of the body, God has also attended to our convenience. The determination and will of the soul may be executed by the organs of the body, without any difficulty or obstacle. By means of the senses it is immediately informed of what interests it, and the several members of the body directly obey its orders. The eye, as it is designed to watch the whole person, occupies the highest place. It can turn freely on all sides, and observe every thing that passes. The ears also are placed in a distinguished part, at the two sides of the head, and are open night and day, to convey to the soul every impression of sound, and to make it attentive to the least noise. As our food passes through the mouth into the stomach, the organ of smell is placed immediately above it, to guard it, as the eye also does,

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from receiving any thing corrupted or bad. As to the sense of feeling, it has not its seat in any particular place, but is spread over all the parts of the body, in order to make it distinguish pleasure from pain, and wholesome from hurtful things. The arms are the ministers the soul employs to execute most of its desires, and are therefore placed near the chest, where the body is the strongest; and, without being too far from the lower parts, are most conveniently situated for every sort of exercise and work, as well as for the guard and safety of the head and other members. —Lastly, the Creator, in the formation of the human body, has deigned also to attend to its beauty. This consists in the visible harmony, the exact proportion of the limbs, and the pleasing mixture of colours in a fine and delicate skin. We may observe, that those parts of the body which are in pairs, as our eyes, ears, arms, legs, are placed at the two sides, of an equal height, corresponding with each other, on the right and left; whereas those that are single, as our forehead, nose, mouth, and chin, are placed in the middle. This proportion appears in the great as well as in the small. The length of the sole of the foot makes the sixth part of the height of the whole body, as the face makes the tenth. In children, the head is larger than it ought to be, in proportion to the rest; because the head, being the chief part of the body, and the seat of four senses, it ought to come the sooner to perfection; and the more so, as being composed entirely of bone, it could not extend as much as the fleshy members, which it must otherwise have done: for we observe that, in infancy, all the limbs grow at the same time, and spread with the most exact proportion in length, breadth, and thickness, according to the size of the whole body.

Admire, O man! the perfection and beauty of thy body, the admirable connection, harmony, and

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proportion, of all its parts. Observe, that each limb is connected with others; that they never interfere with each other's different functions; that they are placed in the manner best adapted for their use, and so as to assist one another mutually. The organs are so many springs in this admirable machine. They correspond with each other, and act in concert, to fulfil the several purposes for which they were designed. Take care not to destroy this machine so curiously contrived, nor to deform it by excesses and irregularities. Take care not to degrade it by shameful passions. On the contrary, let thy body ever remain a monument of the wisdom and goodness of God. But, above all, never neglect thy soul, which has been degraded by sin, but endeavour that it may be restored to its original purity, by the mediation of thy Redeemer. It is by this alone that thou canst be compensated for the change thy body will undergo, when it shall return to the dust from whence it came.

NOV. XX.

The Order and Regularity of the Course of Nature.

IN contemplating the world, we every where discover traces of a Supreme Intelligence directing the whole, which foresaw all the effects that were to result from the powers it impressed upon nature; which had numbered, weighed, and measured all things with infinite wisdom. Thus the universe, when once formed, may always continue, and constantly fulfil its design, without the necessity of changing any of the laws originally established. This is not often the case in respect to the works of man. The best contrived machines soon fail to answer the purposes intended.

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They require to be frequently mended. They are soon spoiled and out of order. The cause of these faults is in the original construction; for there is no artist, however skilful, who can foresee all the changes to which his work is liable; much less is he able to obviate them. The corporeal world is also a machine; but the parts of which it is composed, and their several uses, are numberless. It is divided into many luminous and opaque globes, which serve as habitations for an infinite multitude of living creatures of all sorts. The opaque globes move in the circles prescribed to them, and in a regular time, round the luminous globes, in order to receive from them the light and heat, day and night, seasons, and various climates, food and growth, according to the nature and wants of the different inhabitants. The situation of the planets, and their mutual gravitation, are so diversified, that it seems almost impossible to determine, before-hand, the time of their returning to the point from whence they set out, to begin again their periodical course; and yet, notwithstanding the variety of phenomena which these globes present to us, and the astonishing number of their movements in the course of thousands of years, these enormous masses have never once hit against one another, or interrupted each other's course. All the planets regularly run their course in the time prescribed them. They have constantly preserved their direction and respective distances from the sun. The fixed stars are the same now as they were two thousand years ago. Their distances, their projective force, their direct ascension, their declination, their parallax, their direction, are ever the same. The sun also is still at the same height; the days and nights, years and seasons, are all what they were formerly: an undeniable proof that, in the first arrangement of the celestial bodies, and the regulation of their course, the Author of nature foresaw

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and determined the future state of the world, and of all its parts, to the end of time. The same may be said of our earth, which is annually subject to many revolutions and changes of climate. For, though it seems at first as if the fine weather, the cold, heat, dew, rain, snow, hail, lightning, storms, and winds, were dispensed by chance; as if it was from mere accident that the waters overflow the earth, changing lands into lakes, and in other places seas appearing, where there were continents, mountains forming while others are mouldering away, rivers drying up, or changing their course; yet, it is certain, that each modification of our earth has its sufficient cause in the preceding modification; the last in the former, and so the same from the beginning of all things. But nothing is more calculated to make us sensible of our ignorance, in respect to the particular causes of natural events, and their connection with the future, than this variety which we observe in the temperature of the air; a variety which has such an effect on the appearance and the fertility of our globe. In vain we repeat our meteorological observations; we cannot deduce from them any certain rules and consequences for the future, and we shall never find one year perfectly like another. Yet we are well convinced, that these continual variations, this apparent disorder in the elements, do not destroy our globe, do not alter its form, or make it an uninhabitable chaos; but are, on the contrary, the true means of preserving from year to year its order, fertility, and abundance. Since, therefore, each present modification is founded upon the former, it is evident that the elements were not formed and combined by a blind chance; but that, from the beginning, Boundless Wisdom produced, combined, mixed the elements, measured their force, and determined their effects to all eternity. Thus the world is not composed of unconnected materials,

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which have no relation to one another. It is one regular and perfect whole, the construction and plan of which is the work of a Supreme. If we behold in the world a multitude of beings of the same nature and design with ourselves, and connected with us in many ways; if we discover a still greater number of species of other creatures, who are also more or less mutually connected; if we acknowlegde that, by the mixture and action of the elements, all these animated beings are preserved, and receive all that their nature requires; if afterwards we look beyond this, and raise our thoughts higher; if we consider the connection between our earth and the celestial bodies, the constant regularity of all their motions, the conformity, the wonderful harmony between all the globes within our sight; we should be more and more struck with admiration of the magnificence, order, and beauty of nature, and more clearly convinced of the infinite wisdom of the Creator. But all that we yet know of the order and harmony of the corporeal world, is but a slight ray of that great light of eternity, by which the divine wisdom, now in many ways impenetrable to us, will be made manifest to us hereafter.

NOV. XXI.

Winter in the Northern Countries.

THE time now draws nigh, of which so many discontented people complain. Winter, this severe season, appears to them inconsistent with the plan of the Ruler of the universe, in other respects so wise and beneficent. The rich complain that nature has become dull and melancholy. The poor, whose poverty and wants increase at this season, murmur and lament. Yet let them ever so

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much magnify the inconveniencies and distresses of winter, they will at last be forced to acknowledge the goodness of God towards them, even in this respect, if they compare their lot with that of some other nations. In great part of the northern countries, there is neither spring nor autumn. The heat is as intolerable in summer as the cold is in winter. The severity of the latter is such, that the spirits of wine in the thermometers freeze. When the door of a warm room is opened, the outward air which comes in turns all the vapours into snow; and they appear like thick white clouds. If any one goes out of the house, they are almost suffocated, and the air seems to pierce through them. Every thing appears dead, as nobody dare venture abroad.—Sometimes the cold becomes so intense, all of a sudden, that, if they are not saved in time, people are in danger of losing an arm, a leg, or even their life. The fall of snow is still more dangerous: the wind drives it with such violence, that nobody can find their way; the trees and bushes are covered with it; the sight is blinded by it; and people sink into precipices at every step. In summer it is constantly light for three months; and in winter it is perpetual night during the same space of time. We, who complain of the cold in our countries, what would we say if we were to live in the climate just described? It is certain we do not know our advantages, or a very little reflection would make us content with our lot. The winter days, however melancholy and severe we may think them in our countries, are not insupportable, from the nature of our constitution; and those who cannot bear them, it is their own fault. But wherefore has the Creator ordained that millions of people should live in countries where nature fills them with terror for a great part of the year? Why has he not made all his people as happy as we are? Senseless in-

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quiry. We are mistaken, if we suppose that the inhabitants of the pole are unhappy from the severity and length of their winter. Poor, yet exempt, through simplicity, from all desires difficult to gratify, those people live content in the midst of the rocks of ice which surround them, without knowing the blessings which the southern nations consider as an essential part of their happiness. If the barrenness of their soil prevents them from having such variety of productions of the earth as we have, the sea is so much the more bountiful in her gifts to them. Their way of living inures them to cold, and enables them to defy storms. As to particular resources, nature provides them with abundance. Their deserts are full of wild beasts, whose fur protects them from cold. The rein-deer supplies them with food, drink, beds, clothes, and tents. These are most of their wants, and give them little trouble to obtain. When the sun does not rise with them, and they are surrounded with darkness, nature herself lights a torch for them. The Aurora Borealis brightens their night. Perhaps those people consider their country as the greatest and happiest upon earth, and may pity us as much as we pity them. Thus we find that every climate has its advantages and inconveniencies, which are generally so well balanced, that it is difficult to say which merits a preference. To consider things in this light, there is no country on earth, whether the sun darts its rays upon it perpendicularly or obliquely, whether it is covered eternally with snow or not, which in reality is more benefited than another. In one place the conveniencies of life are more abundant. In another, the variety is absolutely wanting; but those who have not such comforts escape many temptations, corroding cares, bitter remorse; in a word, they are ignorant of many obstacles to happiness, which compensates them for the plea-

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sures they are deprived of. We know, with certainty, that Providence has dispensed to every part of the world whatever was necessary for the support and happiness of the people. All of them are adapted to the nature of the climate; and God provides, by the wisest means, for the wants of his creatures.

NOV. XXII.

The Transformations in Nature.

THE transformations in nature are very numerous; or rather, it may be said, that every thing in the natural world is transformed. The form of objects continually varies. Certain bodies pass successively through the three kingdoms of nature; and there are compositions which gradually become minerals, plants, insects, reptiles, fish, birds, beasts, and men. Every year millions of bodies mix together, and are reduced to dust. Where are the flowers which adorned our gardens, fields, and meadows, during the spring and summer? One species appears, then fades, and makes room for another. The flowers of March, with the modest violet, after having proclaimed the coming of spring, disappear, and give place to the tulip and the rose. In the room of these come others, till all the flowers in their turn, have fulfilled their design. It is the same in respect to mankind. One generation rises, and another disappears. Every year millions of human bodies return to the dust from whence they came; but out of these reduced bodies, there are new ones formed. The salts and oils, of which they are composed, dissolve in the earth; the more subtile parts are attracted by the heat of the sun, and rise into the atmosphere, where they mix with other substances, are scat-

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tered here and there by the wind, and fall again in rain and dew. As for the grosser parts, they mix with the earth. The grass, which is nourished by them, shoots up into long stalks. It is thus that the flesh of man, transformed into grass, serves to feed those flocks, the salutary milk of which turns afterwards into our own substance. These continual transformations in nature, are certain proofs that the Creator ordained that nothing should be useless, or lost. The meal on the flowers, which is the source of fertility in plants, is but a very small part of what each flower contains; but this superfluity is not lost. Divine Wisdom created bees, who make use of it for their honey. The earth bestows daily gifts upon us, and would at last be exhausted, if what it yields was not to be returned again. All organized bodies dissolve, and turn at last to earth. During this dissolution, their volatile parts rise into the atmosphere, and are dispersed about. Thus, the remains of animals are scattered in the air, the earth, and water; and, perhaps, the parts which fly into the atmosphere are much the least numerous. All these particles, dispersed here and there, unite soon again in new organized bodies, which will, in their turn, undergo the same change. These constant transformations, this circulation, which began with the world, will only end with it. But the most remarkable, or at least the most interesting to us, is that which relates to ourselves. We know that our bodies were not originally, nor will they hereafter be composed of the same number of particles as at present. Our bodies, when in our mother's womb, were extremely small; they were larger at our birth; and, since then, they have increased to fifteen or twenty times the size; consequently blood, flesh, and other foreign substances, drawn from the animal or vegetable creation, which did not originally belong to our

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bodies, have since been united with them, and are become parts of ourselves. The necessity we are under of eating every day, shews a continual waste of the parts, and that this loss must be repaired by food. A great deal evaporates insensibly: for it appears, from certain experiments made by a great physician upon himself, that out of eight pounds of food, which a man in health may take every day, there is but a fiftieth part of it which turns to his own substance: all the rest goes off by perspiration, or other excretions. From that it may be inferred, that, ten years hence, there will not remain many of the particles of which we are now composed. And finally, when our bodies shall have gone through several changes, they will be transformed into dust till the day of resurrection, when that last and happy revolution will fix them immutably and for ever. Let us rejoice in this future state, where we shall be free from all the changes of this life. Let us behold, with serenity, the daily revolutions to which all earthly things are subject, and which are necessary in our present state. It is by this means that we shall draw nearer to perfection.

NOV. XXIII.

Greatness of God even in the smallest Things.

WHOEVER loves to contemplate the works of God, will trace him not only in those immense globes which compose the system of the universe, but also in the little world of insects, plants, and metals. He will acknowledge and adore Divine Wisdom as much in the spider's web, as in the power of gravitation, which attracts the earth towards the sun. These researches are now the easier, as the use of microscopes discover to us new scenes, and new worlds, in which we behold,

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in miniature all that can excite our admiration. Those who have not opportunities to make use of these instruments may read at least with pleasure some remarks on microscopic objects.—Let us, in the first place, observe the inanimate world. Behold those mosses, and the grass which God has produced in such abundance! Of how many fine threads and little particles are those plants composed! What variety in their forms and shapes! Who could count all their sorts and kinds? Think of the multitude of little parts which any one is composed of, and into which it may be divided. If an hexagon, of the size of an inch, contains an hundred millions of visible particles, who could calculate the parts of which a mountain must be composed? If millions of particles of water may be suspended on the point of a needle, how many must there be in a fountain? how many in the rivers and seas? If from a lighted candle there issue in a minute many more particles of light than there are grains of sand over the whole earth, how many fiery particles must fly out at a great fire in the space of an hour! If a grain of sand contains several millions of particles of air, how many must there be in the human body? If odoriferous bodies can exhale enough of odoriferous corpuscles, to send the perfume to great distances, without any sensible loss of their own weight, it would require an eternity for the human mind even to calculate the prodigious number of these particles. If we pass next to the animated creation, the scene will in a manner extend to infinity. In the summer-time the air swarms with living creatures. Each drop of water is a little world inhabited. Each leaf of a tree is a colony of insects; and perhaps each grain of sand contains a multitude of animated beings. Each plant, grain, and flower, feeds a million of creatures. Every one must have seen the innumerable swarms of flies, gnats, and other

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insects, which collect together in a very small space; what prodigious shoals must there be in proportion over the whole earth, and in the immense expanse of the atmosphere! How many millions of still smaller insects and worms are there crawling on the ground, or underneath it, the number of which is known only to God! Does not the power of the Creator strike us with astonishment, when we reflect on the multitude of parts of which these little creatures are composed, whose existence is scarce known? If we could not at any time prove it by experiments, should we imagine that there were animals a million of times less than a grain of sand, with organs of nutrition, motion, &c.? There are shell-fish so small, that even through a microscope they scarce appear as large as a grain of barley; and yet they are living animals with very hard houses, in which there are different apartments. How extremely small is a mite, and yet this almost imperceptible atom, when seen through a microscope, is a hairy animal, perfect in all its limbs, of a regular form, full of life and sensibility, and provided with all the necessary organs. Although this animal is scarce visible to us, it has many parts still smaller. One circumstance particularly admirable is, that the glasses which discover so many defects in the best finished works of man, shew us nothing in these microscopic objects but regularity and perfection. How inconceivably fine and tenuous are the spider's threads! It has been calculated, that 36,000 of them would only make the thickness of common sewing silk. Each of the six papillæ, from whence the spider draws the viscous liquor with which it makes the web, is composed of many lesser insensible papillæ, which serve as so many wire-drawing irons for the threads to pass through, in such numbers that one of the strongest of them consists of 6000 lesser threads. How must this strike the mind

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with astonishment! But, suppose we had microscopes which could magnify some millions of times more than those do through which the mite appears as large as a grain of barley, what wonders might we not then discover! Even then we should not be able to see to the end. It would be presumptuous and extravagant to suppose it. Each creature has a kind of infinity, and the more we contemplate the works of God, the more will the miracles of his power multiply in our sight. Our imagination is lost in the two extremities of nature, the great and the small; and we know not in which to admire the Divine Power most, whether in those immense globes which roll over our heads, or in those microscopic objects, almost imperceptible to the sight. Let the contemplation of God's works be therefore our most pleasing occupation. The trouble we may take in studying them will be well rewarded by the pure and innocent pleasures they afford. It will awaken in us an ardent desire to arrive at those happy regions where we shall not need microscopes or telescopes to discover the wonders of God's works, which will be distinctly visible to us, so as to know the design, construction, and connection of each object; where endless hymns will be chaunted to the praise of the Creator of the universe; and where all distinction of great and small will be at an end, as all will be great to us, and all alike fill us with joy and admiration.

NOV. XXIV.

The Weather gradually grows cold.

WE feel that it gradually grows colder every day. In the last month we lost part of the warmth of autumn; but the cold was then very moderate, as the earth was still warmed by the rays of the

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sun. This month is colder already; and the shorter the days grow, the more will the earth lose of its heat, and consequently the cold will increase. This we daily experience; but do we reflect as we ought upon the wisdom and goodness of the Creator, so visible in this insensible progress from heat to cold? In the first place, this gradual increase is indispensably necessary to prevent the disorders, and perhaps the total destruction, of the human frame. If the cold we experience in the depth of winter was to come suddenly at the beginning of autumn, we should be at once numbed and chilled to death. How easily do we catch colds in the cool summer evenings; and how much worse would it be, if we were to pass suddenly from the burning heats of summer to the chilling cold of winter! With what goodness, therefore, has the Creator guarded our health and lives, by granting us such a temperature of air during the months immediately following summer, as to prepare us by degrees to bear the increase of cold, without any bad effects from it. What would become of those animals whose constitutions cannot bear cold, if winter was to come suddenly without notice upon them? Two thirds of the birds and insects would be destroyed in a night, and their nests and eggs with them; but now, by the gradual progress of cold, they have time to make the necessary preparations against it. The autumnal months warn them to quit their homes, to go into warmer countries, or to seek places where they may sleep quietly and secure during the severe season. It would be no less fatal to our fields and gardens, were the earth to be suddenly deprived of the summer's heat. All plants, particularly the exotic plants, would inevitably perish. Spring would produce no flowers, nor would summer afford us fruit. We should not therefore consider it of little consequence, that from the end of sum-

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mer to the beginning of winter, the heat should gradually give place to cold. These insensible changes were necessary for our preservation, and that of the produce of the earth. Presumptuous man, though so often daring to murmur at the laws of nature, would soon find to his cost, were he able to derange one single wheel in the great machine of the world, that he would do much mischief, but could make nothing better. Nothing in nature operates suddenly. All natural events succeed one another by degrees, all in the most regular manner, and precisely at the appointed time. Order is the great law which God lays down in the government of the world; and from thence it is that all his works are so beautiful, so invariable, and so perfect. Let it be our constant employment to study this beauty, this perfection in the works of God, and at every season of the year to trace the divine wisdom and goodness. We should then cease those senseless murmurs with which we offend the Creator so often. We should find order, wisdom, and goodness, in the very things we fancy imperfect; and we should say, at last, from the strongest conviction, "that all the paths of the Lord are mercy and truth, unto such as keep his covenant and his testimonies."

NOV. XXV.

Reflections on Snow.

DURING winter, the dullest season of the year, the ground is often covered with snow. Every body sees it fall, but very few take the trouble to inquire into its nature and use. Such is the fate of most objects which we have daily before us, though we derive many advantages from them. Those things most worth attending

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to are often what we least value. Let us learn to be wiser, and let us employ some moments in reflecting upon snow. It is formed of very light vapours, which congeal in the atmosphere, and fall again in flakes more or less thick. In our climates the snow is pretty large, but travellers assert, that in Lapland it is sometimes so small that it is like a fine dry dust. This certainly proceeds from the great cold of those countries. We observe that the flakes are larger with us in proportion as the cold is more moderate, and they become smaller when it freezes hard. The little flakes of snow are generally like hexagon stars; but there are some of eight angles, others of ten, and some also of an irregular shape. The best way of examining them is to receive the snow on white paper. But there has not hitherto been any satisfactory cause given for the variety of forms. As to the whiteness of this meteor it is not difficult to explain. Snow is extremely thin and light, consequently it has a great many parts, which are certainly full of air. It is, besides, composed of parts more or less close and compact: such a substance does not admit the rays of the sun, or absorb them; on the contrary, it reflects them very strongly, which makes it appear white to us. Snow newly fallen is twenty-four times lighter than water. If twenty-four measures of snow are melted, they produce but one of water. Snow is not frozen water, but only frozen vapours. It evaporates considerably, which the most intense cold cannot prevent. It has been doubted whether it snowed at sea; but those who have gone voyages in the winter on the northern seas, assure us they have had a great deal of snow there. It is known that the high mountains are never entirely free from snow. The air being much warmer in the plains than on heights, it may rain with us, while it snows heavily on high mountains. Snow is of use in several ways. As

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the winter cold is much more hurtful to vegetables than to animals, the plants would perish if they were not preserved by some covering. God ordained, therefore, that the rain, which in summer cools and revives the plants, should in winter fall in the form of a soft wool, to cover the vegetables, and to guard them from the inclemency of frost and winds. The snow has a degree of warmth in it; but not too much, so as to choke the grain. As, like all other vapours, it contains different salts, which it leaves in the ground when it melts, it much enriches the earth. The melted snow not only moistens the earth, but washes every thing hurtful away from the winter seeds and plants. What remains of the snow-water helps to fill up the springs and rivers which had diminished during the winter.

These reflections may convince us, that winter has its advantages, and is not so melancholy a season as many imagine. Let us look up with joy and gratitude towards that beneficent God who causes blessings to flow even from the clouds of snow upon the earth. How unpardonable to murmur, when it is our own fault if we do not everywhere discover traces of the divine wisdom and goodness.

NOV. XXVI.

Sleep of Animals during Winter.

NOW that nature is deprived of so many creatures which render it beautiful and animated, it appears dead. Most of the animals that have disappeared are buried in a profound sleep for the winter. This is the case, not only with the snails, but the bugs, ants, flies, spiders, caterpillars, frogs, lizards, and serpents. It is a mistake to suppose that the ants lay up provisions for the

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winter. The least cold numbs them, and they remain in that state until the return of spring. Of what use then would their stores be, since nature has prevented their requiring food in winter? What they collect in summer, with so much care, is not for their subsistence: they use it as materials to build their habitations. There are also many birds, who, when food begins to fail, hide themselves underground, or in caves, to sleep all the winter. It is at least asserted, that, before winter, the shore-swallows hide underground, the wall-swallows in the hollows of trees, or old buildings, and the common swallows go to the end of ponds, and fasten themselves in pairs to some reeds, where they remain lifeless and motionless, till they are revived by the return of fine weather. There are also some beasts which bury themselves in the ground at the end of summer. The most remarkable of them is the mountain-rat, which generally makes its abode in the Alps. Though it loves to be on the highest mountains, in the region of ice and snow, it is sooner numbed with cold than any other animal; for which reason it retires about the end of September, or the beginning of October, into its subterraneous lodging, to remain there till April. There is much art and precaution in the plan of their winter-residence. It is a sort of gallery, the two branches of which have each their particular opening, and both terminate in a place without any, where they live. One of these two wings goes sloping down underneath their dwelling place; and it is in this lower part of their house that they leave their excrement, which the wet carries away. The other wing is the highest, and is their place of entrance in and out. Their dwelling-place is lined with moss and hay. They make no provision for winter, as it would be useless to them. Before they enter their winter quarters, they prepare themselves each a bed of moss and hay; and

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then, having well closed the entrance into their houses, they compose themselves to sleep. As long as this state of insensibility lasts, they absolutely live without eating. At the beginning of winter, they are so fat, that some of them weigh twenty pounds; but by degrees they fall away, and are very thin in spring. As they do not eat in winter, they have no evacuations. Their great gut is furnished with valves, in the form of a ring, which retain the excrement till their time of waking. It is said that as soon as these animals begin to feel the cold, they go to some spring, and drink copiously for a long time, till what they discharge is clear, and as pure as when they drank it. A natural instinct prompts them to it, in order to prevent the corruption which the accumulated matter in their stomachs might occasion, during their long sleep. When these rats are discovered in their retreats, they are found rolled up round, and sunk into the hay. Their nose is laid on their belly, that they may not breathe a damp air. During their torpid state, they are carried away without being wakened, and they may even be killed without appearing to feel it. There is another sort of rats, whose sleep is as long and as sound as these, and are therefore called the sleepers. The bears eat prodigiously at the beginning of winter, as if they meant to eat enough at once for their whole lives. As they are naturally fat, and are excessively so at the end of autumn, this abundance of fat enables them to bear their abstinence during their winter's repose. The badgers prepare for their retreat into their burrows in the same manner. The instinct of these, and many other animals, teaches them thus to dispense with food for a considerable time. Their very first winter (before experience could inform them) they foresee and prepare for their long sleep. In their peaceable retreats, they know not what want, hunger, or cold, s; they know no season but

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summer. It is remarkable that all animals do not sleep thus in winter. It is only those who, with the severe cold, can also support an abstinence of several months. If winter was to come upon them unprepared, and that suddenly, weakened and numbed with want of food and the cold air, should they still survive it, the only thing we could wonder at would be the strength of their constitution. But as they know how to prepare in time for their sleep, with much care and precaution, it must be imputed to a wonderful instinct bestowed upon them by the Creator. The wisdom and goodness of God have supplied all the wants of his creatures, and this by a thousand means which no human imagination could think of.

NOV. XXVII.

Use of Storms.

PERHAPS there are many who, at this stormy season, reckon the winds and tempests amongst the evils of nature. We do not always think of the advantages which accrue from them: and we do not consider that we might be miserable without them, as we certainly should; for it is storms which purify the atmosphere. To be convinced of this, we need but only attend to the general temperature of this season. What thick and unwholesome fogs! what rainy, dark, and cloudy days it brings! The storms are chiefly designed to disperse these hurtful vapours, and remove them from us; and this is certainly doing us a great service. The universe is governed by the same laws as man, who may be called a little world. Our health depends, in a great measure, on the agitation and mixing of our humours, which would otherwise corrupt. It is the same

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with the world. That the air may not become noxious, it is necessary it should be in perpetual motion, and this is effected by the winds. I do not mean by gentle mild winds, but by storms and tempests, which collect the vapours from different countries; and, by forming them into one mass, mix together the good and bad, and thus connect one with another. Storms are even useful at sea. If it was not often violently agitated, the very calmness of salt water would occasion in it a degree of putrefaction, which would not only destroy the innumerable shoals of fish which live in it, but might also be very hurtful to travellers. Motion is the soul of all nature. It preserves every thing in order, and saves them from destruction. Why should the sea be excepted from the general rule; the sea, which is the common receptacle for all the dregs of the earth, and wherein so many animal and vegetable substances putrefy? If the sea was not in perpetual motion, the water would stagnate, and infect us with an insupportable stench. Motion is as necessary to the sea, as circulation is to the blood of animals; and the other causes which give it a gentle, uniform, and almost insensible motion, are not sufficient to shake and purify the whole mass. Nothing but storms could answer this purpose; and we see what advantages result from them to mankind, and to all animated creatures. These are the uses of storms, and the reasons which ought to prevent us from considering them as destructive plagues, and instruments of divine vengeance. It is certainly true, that storms have often sunk ships richly laden, destroyed the hopes of the farmer and gardener, laid waste whole provinces, and spread terror, desolation, and horror, all around; but what is there in nature which has not its inconveniencies? Shall we reckon the sun amongst the evils of this world, because its situation makes the earth barren for some months,

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aud because, at other times, its heat burns and dries up our grain and fields? The phenomena of nature, which ought to appear formidable to us, are only those where the advantages are nothing in comparison of the evils they draw upon us. But can this be said of storms, if we consider the uses which result from them? Let us then acknowledge that God has planned all with wisdom, and that we ought to be content with the present state of things. Happy those who are convinced that every thing throughout the universe tends to the universal good of the creatures in it; that whatever evils there may be in the world, they are compensated by numberless advantages; and that the very means which Providence makes use of to chastise us, are in themselves indispensable blessings, the general effect of which makes ample amends for the particular evils which may in some cases result from them!

NOV. XXVIII.

Accidental Events.

PROPERLY speaking, nothing can happen by chance, for every thing has its real and certain cause. But what we call chance is no more than the unexpected meeting of several causes which produce an unforeseen effect. Experience shews us that this often happens in life. Unforeseen accidents may entirely change the fortune of men, and overthrow all their designs. It seems as if naturally the race should be to the swift, and the battle to the strong, and success to the wise; yet it does not always happen so: for an unexpected event, a favourable circumstance, an accident impossible to foresee, often does more than all human power, knowledge, or prudence, could do. How much to be pitied, therefore, would mankind be,

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if a wise and beneficent Hand did not regulate events for them! How could God govern mankind, if what we call chance did not obey his voice! The fate of men, families, and even whole kingdoms, often depends on circumstances which appear to us insignificant and trifling. If we take from Providence the rule over these small events, we must at the same time suppose the greatest revolutions in the world equally independent of his government. We know that accidents daily happen, on which our temporal happiness or misery in a great measure depend. It is evident that we cannot guard against these sorts of accidents, because we cannot foresee them; but it follows from thence, that these unexpected events ought to be particularly assigned to the will of Providence. By the wisdom or goodness of God we are left more or less to ourselves, according as we have more or less understanding and power to conduct ourselves rationally. But under circumstances wherein our prudence can be of no use, we may depend upon it, that God will more particularly watch over us. In all other cases, the endeavours and industry of man ought to concur with the aid and protection of Heaven. It is only on occasion of unforeseen accidents that Providence acts alone. As in all that we call chance, we visibly discover traces of the wisdom, goodness, and justice of God, it is evident that chance itself must be subject to divine direction. It is even there that the government of Providence shines with peculiar lustre. When the beauty, order, and plan of the world, fills us with admiration, we conclude, without hesitation, that a Being infinitely wise must preside over it. With how much more reason ought we to draw this inference, when we reflect on the great events which are produced by accidents which no human wisdom could foresee! Have we not a thou-

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sand examples, that the happiness and lives of men, the fate of nations, the success of wars, the revolutions in kingdoms, and the like, depend on accidents entirely unforeseen? An unexpected event may interrupt projects the most secretly and best concerted. It is in Providence alone that we can rest our faith, peace, and hope; with whatever evils we may be surrounded, whatever dangers may threaten us, God can deliver us by a thousand means unknown to ourselves. The lively persuasion of this comfortable truth ought, on the one hand, to inspire us with the most profound respect for the Ruler of the universe; and, on the other, to put our whole trust in God, and to look up to him on every occasion through life. This truth ought also to curb our pride, and to inspire the high and the mighty of this world with the religious fear they ought to have of the great Being, in whose hands there are a thousand means unknown to us, by which the whole structure of happiness we have proudly raised may be destroyed. Lastly, This same truth is highly calculated to banish all doubt, all care and sorrow, from our minds. The infinitely wise Being has a thousand wonderful ways unknown to us. They are the ways of mercy and goodness. He wishes the happiness of his children, and nothing can prevent it. He commands, and all nature obeys.

NOV. XXIX.

The Greatness of God.

NOTHING is more proper for man than to endeavour to form to himself ideas of God, in some degree worthy his greatness and majesty. It is true, that it is as impossible for us to comprehend him perfectly, as to "contain the seas within the hollow of our hand, or to mete the

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heavens with a span." God is at the same time much known to us, and much hidden from us. —He is near us, and yet raised much above us; near to us, as to his existence; above us, and concealed from us, as to his nature, perfection, and decrees. But it is our duty to endeavour to know him, so as to conceive the sentiments of veneration so justly due to him. To assist our weakness in this respect, let us compare him with what men esteem and admire the most, and we shall see that God is infinitely above all. We admire the power of kings, and we are astonished when we hear or see that they have conquered vast empires, taken towns and fortresses, raised stately buildings, and been the means of happiness or misery to whole nations. But if we are struck with the power of a man who is but dust and ashes, and most of whose exploits are owing to foreign arms, how must we admire the power of God, who laid the foundation of the earth, who made the heavens, who holds the sun in his hand, and supports the immense fabric of the universe! We are with reason astonished at the heat of the sun, the impetuosity of the winds, the roaring of the sea, the claps of thunder, and the swift flashes of lightning; but it is God that gives heat to the sun, who thunders in the clouds, who walketh upon the wings of the wind, who raises the storm, and calms the waves of the sea. We very properly respect those who distinguish themselves by the extent of their genius and knowledge; but what is all the understanding and knowledge of man, in comparison with that of the Supreme Being, to whom all things are known, all visible; who counts the stars in the sky, as the sand of the sea; who knows the course that each drop of rain that falls will take; and who, with a single glance, beholds the past, the present, and the future, at the same moment? How much wisdom shines in the con-

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struction of the universe, in the course of the stars, in the plan of our globe, in the least worm, and in the smallest flower! These are masterpieces, which infinitely surpass the greatest and most perfect work of man. We are dazzled with the splendour of riches, and we admire in palaces the magnificence of furniture, the luxury of clothes, the beauty of the apartments, the gold, silver, and precious stones, which shine on every side. But all this, how little is it, if compared with the riches of the Lord our God, whose throne is in the heavens, and the earth his footstool. The heavens are his, the earth also is his, the habitable earth, and all that therein is. All that the world has, of useful or excellent, is drawn from his treasuries.—Life, health, riches, glory, pleasures, all that can form the happiness of his creatures, all is in his hands, and he dispenses every thing according to his good pleasure. We respect the potentates of the earth, when they command multitudes of subjects, and reign over many countries. But what is the corner of the earth which is subject to them, in comparison of the empire of the universe, of which our globe is but a little speck, and which extends over all the stars of heaven, and all their inhabitants? How great is He, to whom all the monarchs of the world are servants, and who sees about his throne the cherubim and seraphim ever ready to fly to execute his command! We judge of the greatness of men by their actions; we celebrate the fame of kings who have built cities and palaces, governed well their states, and happily accomplished great designs. But behold the works of the most high God! the creation of the immense universe, the preservation of so many creatnres, the wise and just government of the universal empire, the redemption of mankind, the reward and punishment of every good and

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bad action. Can any thing be comparable to the greatness of God? Are we not struck with pious rapture, when we represent to ourselves this Being of beings, the Almighty and eternal Lord?

NOV. XXX.

Motives of Content.

LET sweet content take possession of our souls. God is good. Love and mercy shine through all his works. Let us contemplate his mighty deeds. The world, and all it contains, proclaim, and are worthy of him alone. The heavens and the earth witness his power. The sun that rules by day, and the moon that shines by night, all things that have life or motion, proclaim the mighty God. Consider the works of his hands. Men and brutes shew us that his glory is infinite. Even the objects that appear least in our eyes, the blade of grass, and the grain of sand, teach us to know the Lord. Ask the mountains and the abyss, the heights of the heavens, and the depths of the ocean, the winds and the tempest, the worm that crawls in the dust; they will tell you that his wisdom is infinite, and his power wonderful. Oh! how shall we worthily praise and exalt him, to whom we owe existence and life! Our bodies, and the souls which animate them, are gifts of his hands. If we are a prey to adversity, if oppressed with sorrows, scarce do we feel the weight of them, when God enables us to support them. He comes to our assistance, and our evils are banished. O my soul! thou hast long experienced this. Let me never forget it, nor give way to the fear of being deserted by a God who cannot hate his children. Let us therefore submit to his holy will. Let us bless

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him for all his dispensations, persuaded that he will accomplish all his merciful designs; for he is great in wisdom, and abundant in means.

DECEMBER I.

Reflections on Man's Discovery of the Use of Fire.

MONSIEUR BUFFON says, "that man, by his own ingenuity alone, produced the element of fire, which did not exist upon the surface of the earth." It is very true, that fire does not appear to be a natural production, and that it is possible the use of it might be a long time unknown; but does it follow from thence, that man made the discovery, either by his own wisdom, or by chance? If there could be savages in the world who did not know the use of it, they might, perhaps, by chance, or in length of time, produce fire by the rubbing together two pieces of wood, or by striking a flint: but how far is this from knowing the use of it? One might see sparks of fire a thousand times without understanding the nature of this element; without knowing its power of giving warmth, or expelling the horror of darkness; without comprehending how it could be made use of to dress victuals, to bake earthen ware, to boil water, or to melt metals. Pieces of wood rubbed together kindle in time; but why should a man, who is supposed not to know the use of fire, amuse himself in rubbing wood? Supposing he should have done so without any design, he must also, without knowledge or design, have placed himself near a heap of combustible matter. Then, indeed, the fire having been produced, might make him feel a pleasing warmth, but it must soon have been followed by a sharp pain, the effects of this element being entirely unknown to

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him. If a discovery so hazardous, and at the same time so useful, had been made by a man, his name and country would have been as well known, all over the world, as the benefits that result from the discovery. We are told of a certain Prometheus; but he is accused of sacrilege, as having stolen fire from Heaven. This element has been known at all times, and in all countries, and has been almost every where considered as a gift from Heaven. In some countries, they wished to keep it perpetually burning upon altars. Virgins and priests were consecrated for the purpose; which seems to prove that man was never without so useful a gift, and that he received it from the hand of God himself. Why should the Creator, whose goodness shines through all things, have made his creatures to suffer such dreadful inconveniencies, when it was so easy to deliver them from it? Is it not more natural to suppose, that, having taught him (as the scriptures expressly tell us) to offer sacrifices to him, this first act of obedience was rewarded by a visible sign of God's acceptance, which could alone revive the hope of the sinner? And what token could be more proper than that of a miraculous fire, such as that which consumed the sacrifice at the consecration of the tabernacle, and which, by God's command, was never to be extinguished! A miraculous striking mark of divine anger exercising its just vengeance on the victim, the emblem of the sinner, but a sign of mercy likewise towards him, as it made him acquainted with the goodness of his Almighty Father, by the gift of so useful an element, which, in all probability, he could never of himself have discovered.

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DEC. II.

Time in which the World and Mankind were created.

IF we fix the æra of the world's creation according to the scriptures, it can scarce have subsisted above 6000 years. Those who suppose it much older, judge contrary to reason, and to the historical monuments conveyed to us. The history of mankind does not go farther back than that which Moses has transmitted to us; for all that has been said in regard to the origin of the ancients is without foundation, and even their history does not go beyond the deluge. As to the chronological books of the Chinese, they are visibly full of falsehoods. The Phœnicians have had no historian more ancient than Sanchoniathon, who lived after Moses. The Egyptian history does not extend beyond Ham, the son of Noah; and the books of the Jewish lawgiver are the most ancient, as well as the most authentic, of all the monuments of antiquity. If the world was some million of years older, it must have been much more peopled than it is. Population has been constantly increasing since the deluge, and yet there might be three times as many inhabitants on the earth as there are in these days. It has been computed that at least 5000 millions of men might live on our globe: and yet it is not imagined that there are in reality much more than 1080 millions. In Asia they reckon 650 millions, in Africa and America 300, and in Europe 150. If we consider the arts invented by man, we find there were none of them discovered at farthest above two or three thousand years ago. Man owes his aptitude for arts and sciences, not only to his nature and his reason, but to ne-

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cessity, and the desire to procure for himself conveniencies and pleasures; also to vanity and ambition, and to luxury the child of plenty, which creates wants. History carries us back to times when even the most necessary arts were scarce invented, and those but very imperfectly known; and when they had scarce an idea of the first principles of sciences. Four thousand years ago, mankind were still in a state of great ignorance upon most subjects. If we calculate according to the progress made since then, and afterwards go back to the remotest times, we may, in some degree, fix the æra when men knew nothing, in other words, the birth of human kind. If their existence had been of a longer date, it would be impossible that the most useful and indispensable arts should be unknown to them for many ages. On the contrary, all that the human mind is capable of must have been discovered long ago. From this circumstance, therefore, we may again conclude, that the æra of the creation of man is that which Moses has assigned in his history. Would it not be absurd to suppose, that men could be buried in the darkest ignorance, and plunged in a kind of lethargy for thousands of years, and then awaken all at once, to invent arts to procure themselves the comforts and pleasures of life? Another circumstance should here be mentioned. Almost all Europe was formerly covered with immense forests, and very few cities or villages were seen. Germany, for example, was but one great forest. Judge how deserted it must have been. Men could only at first sow the ground where there were empty spaces in parts of the forest. They had no separate property, and changed their habitations every year. In all Germany there was not a single fruit-tree. There grew no fruit but acorns. If we would draw a comparison between the inhabitants of ancient and modern Germany, we must set aside all

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the inhabitants of towns and villages; consider the numerous colonies sent from Germany into other countries; observe that most of the forests being now cut down and turned into ploughed land, ancient Germany could scarce have had the tenth part as much cultivated as the present, and consequently could have had only the tenth part of the inhabitants it has at this time. How many millions less of people were there then! How greatly have they increased since! And yet the forests which reach from Germany to the north-east of Asia, those that still remain in Africa and America, prove that our globe is not near so well peopled as it might be. The farther we go back to antiquity, the less peopled we find the world, and the earth less cultivated. It is then impossible that our globe should have been eternal: for if it had been so, it must have been as well peopled as it now is from time immemorial.

DEC. III.

The Use of Wood.

HOWEVER great, however numerous the advantages we derive from every part of a tree, yet there is none to be compared to the use we make of the wood itself. It grows in such abundance that one might say, God every day creates new provision of it, that we might never want any thing so essential to us. It answers every purpose we wish. It is soft enough to take any form we please; and hard enough to keep that which is once given to it; and as it is easily sawed, bent, and polished, it furnishes us with many utensils, conveniencies, and ornaments. But these are not by any means the most important advantages; they are only for the purposes of conve-

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nience and luxury. We have wants still more indispensable, which we could scarce supply without solid thick wood. It is true that nature furnishes a great quantity of heavy compact bodies: we have stones and marble of which we make many uses; but it is such labour to get them out of their quarries, to convey them to any distance, or to work them, that it is very expensive; whereas we may make use of the largest trees with very little trouble or expence in comparison. By sinking into the ground wooden piles of sixty or ninety feet long, a sure foundation is made for walls, even in loose sand or mud, which would otherwise fall in. These piles, strongly driven down, and made firm, form a forest of immoveable, and sometimes incorruptible trees, in the ground or water, able to sustain the largest and heaviest buildings. It is wood or timber that supports the brick-work, and weight of tiles and lead of which the roofs of our houses are composed. Wood is also a preservative of life, as it is our chief fuel. The sun, undoubtedly, is the soul of nature, but we cannot steal any of its rays to dress our food with, or to melt our metals. Fire, in some measure, supplies the place of the sun; and the more or less of it is in our power. The long winter nights, the cold fogs, and the north wind, would freeze our blood, if we were deprived of the comfortable warmth of fires. How necessary therefore is fuel to us! Was it not for the wisest purposes that the Creator of the world covered one half of the surface of our globe with wood, and yet are we not apt to forget this? Do we always consider as a favour from God the many uses it is to us? Are we sensible how much it contributes to our welfare? Or, because these blessings are too common, do we therefore think them of less importance? It is true, it is easier to acquire wood than gold or diamonds; but is it therefore less a peculiar blessing of Providence?

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Is it not precisely the plenty of wood, and the ease with which we acquire it, that ought so much the more to excite our gratitude, and lead us to bless the Creator of this invaluable gift, the measure of which is so well proportioned to our wants? Such reflections would prove constant subjects of thanksgiving, if we accustomed ourselves to this pleasing though serious turn of mind. Particularly at this season, we are furnished with many occasions to bless God for the mercies he grants to us, and which we ought never to forget.

DEC. IV.

Observations on some Animals.

WE daily experience the different uses that animals are of to us. The Creator has formed some to associate with us, others to feed upon.—All of them are designed, either to supply our wants, or to serve for our pleasure. A dog is by no means a despicable creature. Exclusive of the beauty of its form, its vivacity, strength, and swiftness, it has all the interior qualities which can attract the notice of man. It possesses strong and tender feelings which education still improves, and which render it worthy of being a companion to man. It knows how to promote his designs, to watch and guard him, to flatter, caress, and please its master in many ways. Without the assistance of this faithful domestic, men could not so easily subdue other animals. This interesting animal merits our attention in other respects, as it is capable of things which evidently prove that it is not a mere machine, but that it has a soul within it. Of all animals, the dog has most variety of language. How expressive are its signs of joy when its master returns home? How different are these

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from the signs it makes on the discovery of a robber, on seeing a wolf, or pursuing a hare? What cautious order, what cunning and prudence, in all its motions! The advantages which accrue to us from sheep are still greater, though they have not the dog's art of pleasing. All parts of a sheep are useful to us: its milk, wool, flesh, and even its bones. This animal is remarkable for chewing the cud. As it swallows its food first in a hurry, without chewing it sufficiently, it brings it up again into its mouth, to chew and swallow it a second time. These animals do this because they have but one row of teeth; which defect is compensated by the multiplicity of their stomachs. They have four of them. In the first, which is very large, and called the paunch, the food, almost whole and raw, is a little moistened and softened. The second, which is called the cap, is much smaller. The food macerates better there, and the digestion begins to make some progress. From thence it passes into the third stomach, called the tripe or leaf, where it remains till it is properly soaked and dissolved. Accordingly, this ventricle is composed of several folds or leaves, which prevent any thing from passing which is not fluid. Lastly, the digestion is completed in the fourth stomach, called the runnet. The digested food there changes its colour from green, which it was in the third stomach, and becomes white as milk.—The hare neither wants instinct for its own preservation, nor sagacity to escape its enemies. It makes its own form; it chooses in winter a place exposed to the south, and in summer to the north. In order to conceal itself, it hides between ridges or hillocks nearly of its own colour. When it is pursued by dogs, it flies swiftly, straight forward, then turns round and comes back, throws itself into bye-paths; and after a number of leaps and wheelings about, it goes and hides itself in the trunk of a tree or bush. It

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has the cunning to change place continually, according to circumstances.——The stag has still more cunning and tricks than the hare, and gives much more trouble to the huntsman. Its elegant light form, its well made slender shape, its horns which serve more for ornament than defence, its height, its swiftness, and its strength, distinguish it from the other inhabitants of the wood; and it seems formed to embellish and enliven the gloom of the forests. When we reflect on these, and the innumerable multitudes of animals which inhabit our globe, and which are at our command, how gratefully should we acknowledge the goodness of God! If the earth is composed of so many different soils, it is that such a number of animated beings may find the food adapted to their nature. All lands, good as well as bad, sandy or marshy, gravel or clay, are they not all filled with animated creatures, useful to us in some way or other? The remains of our tables feed the hens, which are so useful to us. The delicate flesh of the pigeon well repays the trouble of providing them with safe and proper houses. The swans clear our ponds and basons of many plants which would corrupt there.—Whole flocks of geese and ducks yield their feathers to us for our beds, and expect nothing in return, but a little poor food, and a pool where they may bathe themselves, play about, dive, and seek worms. In a word, there is not a spot, however barren, that does not contain and feed many useful animals. Can we then ever be insensible of the numberless blessings which God has bestowed upon us.

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DEC. V.

The Formation of Snow and its different Shapes.

SNOW is a kind of frost. The only difference between these two meteors is, that the frost falls like dew upon the surface of certain cold bodies, which draw out its moisture, and on which it remains fixed and close; whereas the snow is formed, before it falls, by congealed vapours in the middle region of the air, which follow the same laws in falling as the fogs, the dew, and the rain do. The air is often extremely cold; and this cold may be considerably increased by the density of the air, and the accession of sharp vapours. It is then easy to comprehend how watery particles may be frozen; but what possibly contributes more than any thing else to freeze the air, are the clouds; for it is generally very cloudy when it snows. The thicker the clouds are, the more they intercept the sun's rays, and prevent their effect. But from the same reason must it not snow sometimes in summer? It may in reality so happen, that in the very midst of summer there may be snow formed in the higher regions of the atmosphere! but it is never so cold at that season as not to melt when the frozen vapours come down to the lower region of air; consequently it does not then appear in the form of snow. It is not the same in winter: as it is then very cold in the lower region of the atmosphere, near the earth, the congealed vapours cannot receive heat enough in falling to melt them, and therefore they preserve their form of snow. The shape of the flakes is very remarkable. They all resemble little stars with six equal rays. It is difficult to discover from whence this regular form proceeds.

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Perhaps it may be imputed to the saline particles which float in the air, and, by uniting with the snow, occasion it to chrystallize. Thus the frozen vapours collecting round these saline particles, which serve as a kernel to them, become formed into hexagons. Also, when the lower air is very cold, these stars fall separately; but when the air is warmer, or more moist, they grow a little soft, and, if they happen to touch, they stick together, and form into flakes, more or less large, according as there are more or less of the little stars joined together. This is the reason that snow never falls in large flakes when the cold is extreme.

An attentive observer cannot but admire the Divine Wisdom and Power, in finding that even in the flakes of snow the most exact proportion, the most perfect regularity, is preserved. How surprised should we be, were we to see them for the first time, and to be told that this brilliant meteor was only owing to some vapours in the atmosphere! How quickly the snow forms! We sometimes are surrounded with it unexpectedly. What multitudes of flakes fall from the clouds, one over another, and in a moment cover the earth! While this affords pleasure to the sight, and abundant subject for reflection, it is well calculated to justify what the pious Brooks says, "That even frost and snow have their charms, and winter has its sweets. None can want innocent and pure pleasures, but those who are so dull and insensible, that they do not reflect on any thing, or give any attention to the works of God."

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DEC. VI.

Winter Plants.

IT is a mistaken opinion, that winter is in general destructive to plants and trees. It is, on the contrary, very certain, that the variety of heat and cold contributes much to the growth and propagation of vegetables. In the warmest climates there are immense deserts, which would be still more barren, if the burning heats were not sometimes succeeded by cold. Winter, so far from being prejudicial to the fertility of the earth, is favourable to it. Even the coldest countries (notwithstanding their snow and ice) have plants which succeed very well. Many trees, for example, the fir, the pine, the juniper, the cedar, the larch, and the box-tree, grow as well in winter as at any other season; and this was necessary, that the forests might furnish us with enough of wood. The house-leek, pepper-wort, marjoram, thyme, sage, lavender, the humble wormwood, and other such plants, preserve their verdure in winter. There are even some flowers which grow under the snow. The single anemony, the early hellebore, the primrose, the hyacinth, and winter narcissus, the snow-drop, or white winter-flower, and all sort of mosses, grow green in the cold. The florists tell us, that the plants under the frigid zone, if put into a green-house, cannot bear a heat beyond 38 degrees; but they bear cold so well, that they grow all the winter in Sweden, as well as in most of the parts of France, Germany, Russia, and the northern parts of China. The vegetables belonging to climates extremely cold cannot bear heat; nor can those which grow on high mountains in any country. Mountains and rocks, whose tops are all the year covered with snow, are not without their

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peculiar plants. On the rocks of Lapland, there grow vegetables which are also found in the Alps and Pyrennean hills, and on the mountains of Spitzberg, but nowhere else. When they are transplanted into gardens, they rise pretty high, but they bear scarce any fruit. Few of the best growing plants in the northern countries can thrive without snow. Thus we find, that there is no land in the immense garden of nature entirely barren. From the finest dust to the hardest rocks, from under the line to the north pole, there is no soil which does not produce and nourish plants peculiar to it. No season is absolutely without flowers or fruit.

Merciful and beneficent Creator! grant that, even in this severe season, we may have a due sense of thy fatherly goodness, and the blessings heaped upon us. If we were properly attentive to the government of thy providence, we should every where find occasion to acknowledge thy goodness and wisdom.

DEC. VII.

An Exhortation to remember the Poor at this Season.

THOSE who are quietly sitting in convenient cheerful houses, and who hear the whistling of the sharp north wind, let them reflect on their unhappy fellow-creatures, many of whom are suffering the utmost severity of poverty and cold.—"Happy those who at this season have a house to shelter them, clothes to cover them, bread and the fruit of the vine to refresh them, with a bed of down on which they may repose and yield to pleasing dreams. Unhappy the poor man to whom fortune refuses even the necessaries of life! Without shelter, without clothes, often stretched

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upon a bed of pain, and too modest to proclaim his wants." We ought all to be touched with the misery of this order of people. How many poor creatures in the streets distressed with cold and hunger! How many old people, with scarce any thing to cover them, exposing themselves for whole hours to the inclemency of the weather, in order to solicit the charity of passengers! How many sick are there without food or nourishment, lying on straw in miserable huts, where the wind, the cold, and the snow penetrate! Winter renders benevolence to the poor the more necessary, because it increases their wants. Is it not the time in which nature itself is poor? and is it not adding double value to our benefactions to bestow them seasonably? If we have been enriched with the summer and autumn fruits, was it not with the intention that we should share them with our fellow-creatures, now, when nature is at rest? The more the cold increases, the more disposed should we be to relieve the necessitous; to pour into the bosom of poverty all we can spare.—What other end could Providence propose in the unequal division of earthly riches, were it not to excite beneficence in the wealthy, by the affecting scenes of the miseries of the poor. Let us therefore have compassion on our fellow-creatures, and not let them suffer more than even the brutes. It is our duty to soften their evils, and Providence permits us to have a share in this honour. It is our duty to clothe, to feed, and to comfort them. Let us then give of our superfluity, or share our little with them. Nobody is so poor that they may not do some good. Let us enjoy the sweetest satisfaction that a noble mind can feel, the godlike pleasure of relieving the wants of others; of softening and lessening their weight of adversity. How easy is it to do this! We need only retrench a few of our expences in dress and pleasures. How fit an offering would it

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be to virtue, were our benevolence to be attended by a conquest over our passions, in retrenching the indulgence of luxury and vanity, in order to bestow our charity on the poor!

DEC. VIII.

Nature is a Lesson for the Heart.

WE gain, in every respect, by studying nature; and it may with reason be called a school for the heart, since it clearly instructs us in our duty towards God, our neighbour, and ourselves. Can any thing inspire us with more profound veneration towards God, than the reflection that it is he who has not only formed our globe from nothing, but his almighty hand also that confines the sun within its orb, and the sea within its bounds? Can we humble ourselves too much before that Being who created the innumerable worlds which roll over our heads? What are we in comparison to those immense globes, and how little must the earth in all its glory appear, when considered in that light! Must we not shudder at the very thought of offending this God, whose boundless power we every moment see proofs of, and who, with a single glance, can destroy or make us wretched: but the contemplation of nature is also highly calculated to fill us with love and gratitude towards its Author. All nature loudly proclaims this comfortable truth, that God is love. It was love that induced him to create the world, and to communicate to other beings the felicity which he himself enjoys. For this purpose he created the universe, and an innumerable multitude of creatures, that all of them, from the archangel to the worm, should feel, each according to its nature and capacity, the effects of Divine Goodness. Is there, in reality, a single creature which

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does not furnish proofs of his immense goodness? But particularly, if we reflect on ourselves, how many may we not find? The Creator has endowed us with reason, not only to enjoy his blessings, but to acknowledge also this love with which he honours us. He ordained that we should have dominion over the animals, to make them subservient to our wants and conveniencies. It is also for us that the earth produces fruit in such abundance. So many blessings daily enjoyed, and to which we owe the continuance of our existence; the disinterested love of this great Being, who can receive no return from his creatures, and whose felicity can admit of no increase,—can we be insensible to all this? Must it not excite the most grateful love for our bountiful Creator? I cannot conceive it possible for mean and selfish sentiments to fill the heart of a man, who, in the contemplation of nature, must every where discover traces of infinite beneficence in the Supreme Being, who does not less propose the happiness of each individual, than the universal good of the world. If we reflect on the ways of Providence, it is impossible not to be sensibly touched with the goodness and mercy of God towards every living creature: and the heart must be depraved to a very great degree, which is not inspired to imitate, as much as possible, his universal benevolence: for "God maketh his sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust." Can we then exclude any from our charity, or be partial in the distribution of it? Lastly, When we reflect on the admirable order which reigns throughout all nature, ought it not to produce the best dispositions in our minds? If we are convinced that nothing can be pleasing to God, which is contrary to order and regularity, should we not conform to it? How unpardonable to oppose, by our irregularities, the merciful designs of Providence in our favour? Ought we

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not to second them, by our endeavours to correct ourselves? It is by these means that nature becomes an excellent lesson for the heart. If we listen to it, we shall learn the true wisdom which leads to everlasting happiness.

DEC. IX.

God's goodness towards us is shewn in the very things which appear hurtful.

MOST people wish that they were not exposed to any evils in this world. If they had their choice, they would endeavour to secure to themselves a life free from all cares. But is it true, that we should be really happy, if nothing ever so trifling was to disturb our tranquillity, or if, through our lives, there was to be no vicissitudes of sad or pleasing events? This question, on the decision of which depends our peace in this world, is worth examining; while we should, at the same time, guard as much as possible against the delusions of self-love. Should we be really happy here if we enjoyed uninterrupted good fortune? I do not believe we should. A constant state of happiness would soon grow insipid, and this disgust would change our felicity into a real evil. On the contrary, the evils we sometimes meet with enhance the value of our blessings, as colours are relieved and set off by shade. If there was no winter, should we be as sensible as we are of the charms of spring? Should we know the value of health without sickness, the sweets of repose without labour, the peace and consolation of a good conscience, if we had never been tried and tempted? The more obstacles there are to our happiness, the greater our joy when we surmount them. The heavier our misfortunes are, the more happy

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we feel when delivered from them. If all our days were prosperous, we should give ourselves up to luxury, pride, and ambition. If we were never pressed to it by necessity, nobody would take the trouble to be active or laborious in business; nobody would make use of their talents, nor cultivate their minds; nobody would be animated with zeal for the public good. If we were never liable to danger, how should we become prudent, how should we learn compassion? If we had no evils to fear, how easily should we be intoxicated with happiness, and forget our gratitude to God, charity towards our neighbour, and all our duties in general! Are not then these virtues, these blessings of the soul, a thousand times preferable to a constant train of pleasing sensations, which would also become dull and insipid to us by possession. He who reposes always in the lap of felicity, soon grows negligent of doing good, and is incapable of any great action; but let him feel the strokes of adversity, and he will recover his wisdom, activity, and virtue. How unjust and inconsistent are the desires of man! Men wish to live quiet, contented, and happy, and they object to the means which lead to it. In the heat of summer we sigh for coolness; and yet we are displeased when we see the clouds collect which are to obtain this for us. Thunder-storms purify the air, and make the earth fruitful; yet we complain that the flashes of lightning terrify us. We acknowledge the use of coals, minerals, and baths; but we do not like earthquakes. We wish that there should be no infectious or epidemical disorders, and yet we complain of the storms which prevent the air from corrupting. We love to be attended by servants, and yet we wish there was no poverty or inequality of situations. In a word, we wish in most things for the end without the means. Let us acknowledge the wise and beneficent designs

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of God, even when he permits frequent alternatives in our lives, from joy to sorrow, from happiness to misery. Is he not the Arbiter of our fate? Is he not our Father, whose goodness we ought to be convinced of, even when he thinks proper to chasten us? Are we not in a world subject by nature to revolutions? Have we not often experienced, in the course of our lives, that what our ignorance made us consider as an evil, has in reality proved a happiness to us? Let us then receive with calm resignation, from the hand of God, the evils he may think proper to inflict. They will only appear terrible at first; the longer we are used to them, the more supportable we shall find them, and the more we shall feel their salutary effects. If, in our adversity, we are patient, with faith and hope, we shall come at last to bless God for the trials he sends us. In a future state, we shall undoubtedly do so, and shall form a very different opinion of the troubles we have undergone in this world. We shall then be convinced, that without these afflictions, which we now lament, we should never obtain the happiness designed for us hereafter.

DEC. X.

Incidental Revolutions of our Globe.

NATURE every day produces of itself changes on the surface of the earth which affect the whole globe. Many ancient monuments prove that its surface in several places sinks down more or less; sometimes quicker, sometimes slower. The wall built by the Romans in Scotland in the second century, which went across the whole kingdom, from sea to sea, is at present almost entirely underground; and there are remains of it every day still discovered. The mountains, those pil-

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lars of the earth, are exposed to the same overthrow, occasioned either by the nature of the ground, the waters which undermine and sap them, or by subterraneous fires. But when some parts of the globe sink down, there are others, on the contrary, which rise up. A fertile valley, at the end of the century, may be converted into a marsh, where clay, turf, and other substances, form beds, one over another. Lakes and gulphs turn into land. In stagnant water there grows a quantity of rushes, sea-weed, and other plants. The animal and vegetable substances, by corrupting in it, gradually form a sort of mud and mould; and the bottom at last rises so high, that what was formerly water becomes dry land. The subterraneous fires also produce great changes on our globe. Their effects are shewn by three different commotions, which are generally felt separately, but which sometimes come altogether. The first consists in a horizontal motion back and forward. When these are violent and uneven, they throw down buildings, and overturn every thing. These undulating commotions are particularly observed in the waters. There are other earthquakes, called pulsations, or liftings up. They sometimes cause new islands to rise all of a sudden from the bottom of the sea. The crust of the earth, being lifted up with great violence, falls down again, sinks in deeper breaks, and forms lakes, marshes, and springs. Lastly, there are explosions, like the springing up of a mine, with eruptions of inflammable matter attending them. These violent shocks and convulsions occasion great devastation, and considerable alterations on the surface of our planet. The outer coat of the earth breaks in different places, sinks in on one side, and rises up on the other. The sea also partakes of those commotions; and the most sensible effect that appears from them are the new islands which rise up. They are produced by the bottom

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of the sea being raised up; or they are composed of pumice stones, of calcined rocks, or other substances thrown out from some volcano. History informs us, that by earthquakes, which subterraneons fires occasioned, whole cities have been swallowed up, and sunk sixty feet underground; so that afterwards the earth which covered them was sowed and cultivated. Several of the alterations produced on our globe have been caused by the undermining of waters. Heavy rains soak into the mountains, soften and loosen much earth from them; which being swept away into the sea and the rivers, raise the bottom of them considerably. The course of water is often diverted. Even the banks change their place. Sometimes the sea retires, and leaves whole continents dry, which used to be its bed. Sometimes it overflows lands, and covers whole countries. Kingdoms that were formerly close to the sea, are at present removed to a great distance from it. The anchors, the great iron rings to moor vessels, and the wrecks of ships found upon mountains, in marshes, and at a great distance from the ocean, prove, beyond a doubt, that many places which are now terra firma were formerly covered by the sea. There is every reason to believe that England was formerly joined to France: the beds of the earth and stone, which are the same on both sides of Calais, and the shallowness of that strait, seem to prove it—Climates even occasion great revolutions in our globe. Between the tropics the heat and rains take their turn, six months of each successively. Countries nearer the pole are liable to great change by the severity of cold. In autumn, the water penetrates through a multitude of little crevices into the rocks and mountains. It freezes there in winter, and the ice dilating and bursting causes great havoc. Such revolutions, produced by accidental causes, are evident proofs that the world itself is frail. It

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also proves that God is not an idle spectator of the alterations our globe undergoes, but that he plans and directs the whole by laws infinitely wise. From hence, too, we may learn, that all things here are subject to constant vicissitudes. We may even observe that frequent accidental changes give a new face, not only to the inanimate, but to the animated part of the creation. One generation gives place to another. Amongst men, there are some who rise, while others fall. Some are raised to honours and dignity, others sink into poverty and contempt. There are continual migrations and change of situation amongst creatures; visible differences and gradations in their condition and faculties. God has allotted to all beings different periods of duration. Some are designed for a short and momentary existence; others for a longer; and some for an everlasting life. In all this, how evidently does the wisdom, power, and goodness of the Creator shine forth!

DEC. XI.

Sentiments of Gratitude on reflecting upon the Clothing provided for us by Providence.

THE goodness of Providence appears even in our clothing. How many animals bestow upon us their skins, their hair, and their fur, for this purpose! The sheep alone, with its wool, furnishes the most necessary part of our dress; and it is to the valuable labour of a worm that we owe our silks. How many plants, also, do we find of use in this respect! Hemp and flax furnish us with linen; and many different textures are formed of cotton: but even those vast stores of nature would be insufficient, if God had not endowed man with industry, and with an inexhaustible fund of invention, to contrive and pre-

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pare clothing of many sorts. When we reflect on all the preparations for making linen, we shall find how many hands are necessary for a few yards only. It seems as if we should be but little vain of dress, as we must have recourse for it, not only to the animals most contemptible in our eyes, but also to the rank of people our pride disdains the most. But why has the Creator obliged us to provide ourselves with clothing, while all other animals receive theirs directly from Nature? We may answer this question, by saying, that it is for our good. It is, on the one hand, useful to our health, and, on the other, adapted to our way of life. We may, by these means, suit our dress to the different seasons of the year, the climate we live in, the situation and profession we have chosen. Our clothes promote insensible perspiration, so essential to the preservation of life. The necessity of obtaining them for ourselves exercises the human mind, and has given rise to the invention of many arts. And, lastly, the labour it requires furnishes subsistence for a number of trades-persons. We have, therefore, great reason to be content with this plan of Providence: let us only take care not to frustrate the designs proposed by it. A good man ought never to glory in the outward ornaments of his body, but rather in the inward qualities of his mind. Pride assumes many different forms. It inwardly glories in the most trifling advantages, supposes some that do not exist, or else sets too high a value on those that do. And, in regard to the outside, some shew their pride under the splendour of silks, gold, and jewels, whilst others hide and nourish it under rags. The good man will equally avoid either extreme. The former is totally senseless. It degrades human nature to glory in outward ornament. We wear clothes to preserve us from cold, a precaution which man's weakness, since

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the fall, made necessary for decency, also to mark the difference of sexes.

DEC. XII.

The Clothing of Animals.

IT is a wonderful work of Providence, that all animals should be naturally provided with the clothing best adapted to their situation and manner of living. Some are covered with hair, others with feathers, many with scales and shells. This variety is a certain sign that a wise Artificer prepared their clothing; for they are not only adapted in general to the different species, but appropriated to each of the individuals. Hair was the most convenient for the quadrupeds. Nature, in giving it to them, has likewise so formed the texture of their skin, that they can easily lie down on the ground in any weather, and be employed in the service of man. The thick fur of some animals not only guards them from wet and cold, but serves them also to cover their young, and make soft beds for them. For birds, and some sorts of insects, feathers were the best clothing. Besides protecting them from cold and wet, they are ranged in the manner most proper to support them in the air. The feathers for this purpose cover the whole body, and their construction is so delicate as to be favourable to the bird's flight. Light and hollow, the quills are filled with a sort of marrow, which strengthens them; and they are rendered thick enough for warmth, by filaments finer than hair, interwoven with much art, which not only guards them from the inclemency of weather, but gives a proper substance to the wing.—The clothing of reptiles is perfectly suited to their way of life. Observe, for example, the earth-

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worm. Its body is composed of a succession of little rings; each ring is furnished with a certain number of muscles, by means of which the worm can extend or contract its body very much. These insects have under their skin a gluey juice, which perspires, and makes their bodies more easily to slip under the ground, which they could not do if they were covered with hair, feathers, or scales. The substance with which the aquatic animals are covered is equally fit for the element they inhabit. Fish could have no clothing more convenient than scales; the form, hardness, size, number, and position of which are perfectly adapted to their way of living. They could not be better clothed or housed than they are. Even the most disagreeable creature has some peculiar beauty; but it is on some of the birds and insects which the Creator has lavished most ornaments. If we observe the butterflies, their beauty must strike us with surprise and admiration. Some are clothed plain, and all of one colour: others are a little adorned; and others shine with the greatest variety of the brightest colours. How much also has nature diversified the beauty and plumage of birds! The little colibri, an American bird, is one of the wonders of nature. It is no larger than a great fly, but of so beautiful a plumage, that its head and wings resemble a rainbow. Its neck is of a bright ruby red; the belly and under part of the wings are of a gold colour; the legs green as an emerald; the claws and bill black and polished as ebony. The males have a little tuft on their heads, composed of all the colours of the rest of the body collected together, which are worn as ear-rings by Mexican women. It is impossible not to suppose, that, in the covering of birds, God had in view their convenience, use, and beauty. Each animal has what best suits it. Nothing superfluous; nothing wanting; every thing so planned, so complete, even in the lowest creatures, that the

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whole art of man could not imitate it. Does not this forcibly prove the existence of a Being, whose infinite wisdom unites with unlimited goodness, to render each creature as happy as its nature and design will admit of?

DEC. XIII.

Thoughts upon the Ravages of Winter.

I HEAR the winds and the tempests roar. My blood is frozen in my veins. The darkness of the day, its light almost extinguished, a disposition in myself to terror and fright, all concur to make this tumult and disorder in nature appear the more dreadful! How often has the wind blown down cottages, and even palaces; thus, in a moment, destroying the labour of years. How often has it plunged into the abyss ships, and the unhappy beings who hazarded their lives on such frail foundations! How often has it torn up by the roots the stately oak! But Thou, O God, art the Creator and Ruler of all things. The tempest and the northern blast are the messengers, the heralds of thy power, and the ministers of thy will. If Thou didst not set bounds to their destructive power, they would every where, and at all times, occasion the same mischief; and yet we behold the poor cottage, which nothing shelters from their fury, still standing. Thanks to Divine Power, which rebukes the winds and the sea. Thanks to that Wisdom, which has ordained all for the best. In the mean time, it may be asked, Why the mischief which storms and tempests occasion should be permitted, if the world and all the events of it are the works of Infinite Wisdom? Can Perfect Wisdom produce any thing but order, Perfect Goodness any thing that is bad? Or is it thus that frail humanity may reason! But

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what is man, that he dare dispute with God! Shall the creature say to his Creator, Why hast Thou made me thus? And because we cannot comprehend the works of God, does it therefore follow that they are destructive? In order to judge of them, and of the purposes for which they were designed, we should equal him in knowledge and wisdom. It is a miracle even that we are able to perceive part of the order he has established, or to take in any of this wise and extensive plan; and, considering our want of understanding, that things do not appear still more confusedly to us. Alas! all would be disorder and confusion; there could be neither order, harmony, nor happiness, in the universe, if there did not exist a Being, whose wisdom, goodness, and power, surpass all our conceptions; who created the world and all things in it. If the general plan, and common course of nature visibly tend to the welfare of all created beings, whatever particular accidents may seem to contradict the design, they only prove our ignorance and limited understandings. To form one whole out of the materials of which the visible world is composed, wherein such magnificent phenomena appear, wherein are displayed the several beauties and treasures of knowledge, virtue, and felicity, which we behold in it, is a work so wonderful and divine, as none could have conceived or executed, but an omniscient, almighty, and perfect Being. The farther we advance in the researches of Nature's works, the more clearly we distinguish the wisdom and goodness which governs the whole. From these principles we shall judge very differently from what we should otherwise do, in respect to the complaints we make of winter. Even the storms, the snow, and the hail, all that appears at this season so disagreeable to us, is linked with the everlasting order of things. There is reason in all: the exact time is allotted for every thing; and, by means

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of these revolutions, Divine Wisdom keeps up harmony throughout the immense universe. The wind, which frightens the mariner at sea, drives the water upon barren lands. The sulphureous vapours, and other matter, carried by the winds from one country to another, refresh the earth, and restore fertility. Thus the winter, which appears to destroy, gives strength to our fallow-ground for new harvests. At present, the ground, the garden, and seeds rest, buried under ice and snow; the inhabitants of the forests howl more hideously; the wild beasts are pressed with hunger; the whole world appears dead. But God preserves it under the appearance of death! He watches over fainting nature. What miracles he performs in the midst of the frightful scenes of winter! The sparrow, which finds no food at present, lives, however, in its retreat upon the gifts of God's beneficence. The earth no longer produces any thing; but his hand, which is never closed, procures us bread and water, and calls to existence things which are not yet in being.

DEC. XIV.

The Sagacity of Animals in finding means of Subsistence for the Winter.

THERE are some animals that lay up stores for winter, and in their harvest-time prepare provisions for six months. It might be supposed they foresee a season in which they could not gather food; and that, guarding against future wants, they can calculate how much they and their families would require. The bees are almost the only insects which lay up provision for the winter. They are wonderful economists of their wax, because they can gather no more when the season for flowers is over, and have then no

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resources for subsistence, or for making their cells, but what they have already collected. They have also the prudence to gather another kind of substance which they have occasion for to keep out the cold from their hives. It is a sort of glue they extract from the flowers, and from bitter plants, with which they closely stop up all the holes in the hive. They let nothing be lost; and what they do not want at the present, they lay it up for the future. Those who have narrowly observed them, assure us, that, when in winter they uncover the honey-combs, they carry off the wax with which the cells were shut up, and lay it up for future use. Amongst the four-footed animals, the field mice are those which lay up winter provisions, and in harvest-time convey a quantity of grain into their subterraneous habitations. Magpies and jays are the birds which collect for the winter. They gather heaps of acorns in autumn, which they keep in the hollow parts of trees. The animals that sleep all the winter make no provisions, as they would be useless; but the others are not content with providing for the present moment, they think also of the future, and it has never been observed that they failed in collecting a sufficient quantity for that time. These economical cares cannot be from reflection, for that would be to suppose animals endowed with much more intelligence than they really have. In fact, they only think of the present, and of whatever affects their senses, either agreeably or disagreeably. If the present influences the future, it is without any design or consciousness of theirs. How, indeed, can there be supposed any foresight or reflection in this instinct of animals, when they have no experience of the changes of seasons, or the nature of winter; and when, having no idea of measuring time, they neither know when winter will come, or how long it will last. Nor

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can they be supposed to have any reason or ideas of futurity, nor to seek means of subsisting, during the severe season, from reflection, since they always act invariably the same, and each species follows constantly and naturally the same method, without having been taught. For example, then, when the industrious bees go on collecting honey and wax, filling their magazines with it as long as the season permits, it is not because they foresee that there will come a time in which they cannot gather. How should creatures, who have none but mere sensual perceptions, judge of the future? Every thing is so ordered, that the bees find themselves provided, without having thought of collecting it. Nature prompts them to gather wax and honey. They labour during the fine weather, and when winter comes, they find their magazines full. These animals, like all others, act blindly, and almost mechanically, without reflection or design, though they appear to be led by the rules of wisdom and prudence. Being then void of reason, this wise economy, this appearance of foresight and reflection, must necessarily be the consequence of a superior Intelligence, whose views they fulfil, without knowing it. In this consists part of our superiority over the brute creation. We can represent to our minds the past and the future. We can act from reflection, and from plans. We can be determined by motives, and choose what best suits us. But how important is it that we should make a good use of these prerogatives! Informed as we are of the great revolutions which await us, and being enabled to look forward to the winter of life, ought we not to lay up for ourselves consolations and resources which may render the latter end of it not only supportable, but happy? Nothing is more miserable than an old person who has passed his best days with a careless indifference about futurity, and finds

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himself, in the winter of life, void of every resource or comfort. Will not such reflections lead us to take early measures for our happiness, not only in old age, but in a future state?

DEC. XV.

The Advantages of Winter.

LET us reflect on the blessings God grants us at this season which appears to us so severe. The frost and cold prevent many hurtful vapours in the higher regions of the atmosphere from falling upon us, and even purifies the air. Far from being always bad for our health, it often strengthens it, and preserves the humours from putrefaction, which a constant heat would certainly occasion. If the vapours, which collect in the atmosphere, were always to fall in rain, the earth would be too soft and wet, our bodies would be too full of humours, and too much relaxed; whereas the cold braces and promotes the circulation of the blood. In very hot countries, and where the winters are rainy and wet, serious and mortal diseases are much more frequent than elsewhere. We are told by travellers, that in Greenland, where the ground is covered with mountains of ice, and where, in winter, the days are only four or five hours long, the air is very wholesome, clear, and light: and, except a few complaints in the chest and eyes (occasioned partly by the quality of the food), they have seldom there the disorders so common in Europe. It is also certain that the constitution of the human body varies according to the different climates; consequently, the inhabitants of the northern countries have constitutions adapted to extreme cold, and are generally strong and robust. As man, though active by choice, and

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though labour is necessary to him, is still glad to interrupt his employments to taste the sweets of sleep; so also our nature yields to the change of seasons, and takes a pleasure in it, because, in reality, it contributes towards our welfare and happiness. Behold our fields and gardens! They are indeed buried in snow; but this is necessary, in order to preserve them from the cold, as well as to prevent the grain from corrupting. The ground requires rest, after having yielded in the summer all that we want for the winter. If our present support had not been provided for, if, in this severe season, we were obliged to cultivate the earth, there might be some foundation for our complaints. But all our wants are supplied, and we enjoy a repose suitable to the season.

How tender are the mercies of Providence during these winter months! God has given industry to mankind, which is necessary to keep them from cold or frost. Their inventive mind has afforded them means of procuring an artificial warmth, from which they enjoy, in their apartments, some of the comforts of summer. The mercy of Providence is no less visible in the yearly produce of wood, and its astonishing increase, than in the fertility of our fields. We have also at this season multitudes of creatures at our command, to make it tolerable to us. The colder the countries are, the more of those useful animals are found, whose furs are designed to keep us warm. Is it not evident that Divine Wisdom foresaw the several wants of the different countries, and designed to relieve them by placing animals in them which could not live any where else? Our beasts of burden bring us the necessary provisions; and it is remarkable that our cattle are generally fruitful in the time we most require it. Winter does not interrupt trade, nor the exercise of professions. The rivers have lost their fluidity in many places; they are

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become hard as iron; the surface is closed and covered with ice. This facilitates the intercourse between the inhabitants who were before divided. They are not condemned to inaction or idleness at this season: and though they are obliged to interrupt the labours of the field, they have a thousand ways of employing themselves usefully in domestic life. The sleep of nature prompts them to look into themselves. It is true, they can no longer behold the beauties which spring and summer presented; but their minds may be so much the more at liberty to reflect, even in the midst of darkness and night, upon the instability of all earthly things, which may lead them to a firm resolution of devoting themselves to the service of that great Being who is immutable. Man is now at leisure, in his calm retreat, to cultivate his mind, to examine his own heart, to correct his faults, and to lay up treasures of good works. Happy they who make so good an use of this season!

DEC. XVI.

The Elements.

WHETHER we consider the universe taken in the whole, or examine the different parts of it separately, we shall find equal reason to admire the power and wisdom of the Creator. It is true that we can but imperfectly know any thing, and can seldom go beyond conjecture and probabilities. But this is sufficient to prove to us, on one hand, the greatness of God, and on the other, the weakness of our reason. Perhaps all the elements are of the same nature, and may be reduced to one only. Perhaps they are so combined as to form but one whole. But it would be very difficult for

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us to imagine this to ourselves. We must divide them in our minds, and consider separately the primitive parts of which they are composed. What variety of wonderful properties are there in the *air* which we every moment breathe! With what force it divides and dissolves all sorts of substances, contrasting, at the same time, their different qualities! The vapours and exhalations without number, which blend and unite with it, make it sometimes hurtful, but, in general, wholesome and good. Those foreign particles with which the air is loaded, its elasticity, the quality it has of rarifying, of condensing, and of recovering its natural state, produce those meteors which disperse the noxious vapours, purify the earth, and promote the vegetation of plants. And though the effects of the air are sometimes dreadful, they are absolutely necessary to prevent the earth from becoming a barren desert. There are, however, in this element, as in all God's works, impenetrable mysteries. Who, for example, can explain how the particles of air, though so subtile as to be invisible to us, are the means by which every other object becomes visible? What is more wonderful than the balance between the outward air and that which is within us, a balance on which our life and preservation depends? Can we sufficiently admire that one and the same element should transmit sound, smell, and light to us? There is a great conformity between air and *water*. Its effects are no less variable or admirable. How many different qualities has God given to this element! All the abundance and salubrity of the air, all the richness of the earth, or warmth of fire, would not save us from perishing, if we were without water. How many changes is it susceptible of? What gave it the property of dilating or separating, and of becoming so vo-

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latile as to rise to the height of a league up into the atmosphere, to swim in it, and to form into fogs and clouds? What gave it the power of penetrating into plants, of coming out of them again through insensible pores, and of spreading all over our fields and valleys in the form of a refreshing dew? How astonishing is the property it has of becoming sometimes lighter than air, though a quantity of water is nearly nine times heavier than an equal quantity of air; of resuming afterwards its natural weight, of fixing to other bodies, of dissolving the most compact substances, and of mixing even with fire. Of all the elements, there is none we know so little the nature of as *fire*. It is too subtile for sight, but its qualities, properties, and effects, are visible enough. Whether the essence of fire consists in motion only, or in the fermentation of what we call inflammable matter, or (which many experiments render probable) whether it be a simple substance, different in its nature from all other bodies, still it is certain that the prodigious quantity of it, its uses, its wonderful effects deserve all our attention. There is nothing, however cold, which does not contain fiery particles, that shew themselves when they are warmed by any violent motion. Fire exists every where. It is in the air we breathe, in the water we drink, and in the earth which nourishes us. It is a part of the composition of all bodies; it goes through their smallest pores; it unites closely with them; it moves with them from one place to another; and, however confined, it forces itself to be felt at last. With what power it dilates the surrounding air, whilst the air, in its turn, keeps up the fire, and makes it more alive and violent. Fire gives fluidity to water, fertility to the earth, health to mankind, and life to all animals. The *earth*, when pure, is distinguished from other bodies, by having

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neither taste nor smell, by not being soluble either in water or spirits of wine, and being easily bruised between our fingers. At first sight, it appears very different from any other element, and yet it has so much conformity with them, that there are naturalists who believe that water is nothing but dissolved earth, and that the earth is only water grown thick and condensed. According to their system, the water constantly diminishes upon our globe, and forms, by degrees, compact bodies; because that formerly our planet was only a wet and fluid mass, and that, in still more remote time, the whole was water.

All the elements are necessary to our existence and preservation; and there are none which are not admirable, if we reflect on their properties, and the variety of effects they produce. How many properties, different from each other, has not God communicated to his works! How many agents in the heavens, and upon earth, always in motion for the preservation of the universe in general, and of each individual in particular! What revolutions, what phenomena, are produced by the combination only of the elements! It would be easier to number God's creatures, than to number the acting powers. But what must be the power from whence all these proceed! They all depend upon the will of an almighty Creator. He has realized them all. He has impressed upon them a constant, uniform, and salutary motion. It is He who maintains the elements in that equilibrium to which the world owes its preservation.

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DEC. XVII.

The Sun's Influence on the Earth.

THE sun is the principal cause of all that happens upon the earth. It is the constant source of that light which is so profusely spread over our globe. This light of the sun is the most subtile fire. It penetrates into all bodies, and puts all their parts in motion. It attenuates and separates them. It dissolves those that are solid, rarefies still more those that are fluid, and renders them fit for an infinite number of affects. Is it not evident, that on this variety of influence which the sun has on other bodies depend all the phenomena, and all the revolutions of the globe, even in the smallest circumstances? When the force of the sun's light increases, that is to say, when the rays fall less obliquely, and in a greater quantity, on a given space, and they act longer each day, as is the case in summer, this must necessarily operate more considerable changes, both in the atmosphere, and on the surface of the earth. When the rays fall more obliquely in the same space, and consequently are weaker, and in less quantity, and the days being shorter, their effect is shortened also; as in winter, how different is the face of the earth, and what a change is observable in the atmosphere! What a gradual difference appears, when, from the remotest line, the sun begins to draw nearer and nearer to the equinox, till the days and nights become of equal length! And how many new phenomena appear, when that luminous and active body retrogrades in summer from the tropic of Cancer towards the line, till the days and nights become again equal in autumn, and the sun removes from our zenith! It is on the distance of this body that depend all the varia-

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tions we observe in the vegetation of plants, and the interior constitution of bodies, in all climates, and at every season. This is the reason that each season and climate have plants and animals peculiar to them, and that the progress of vegetation is more or less rapid. But it would be beyond our powers not only to describe, but even to point out the different effects of the sun upon our earth. All the changes and revolutions of the globe have for principle the influence of the sun, as the several degrees of heat and cold depend chiefly upon it: I say chiefly, because the nature of the soil, the mountains more or less high, and their different situations, may also contribute something towards a country's being more or less cold, more or less subject to rain, wind, and other variations of the atmosphere. But it remains undeniably certain, that these accessory causes would not be sufficient to produce the effects observable in many places and times. For certainly these effects would not be produced, if the heat of the sun did not act in the manner it does. It requires but very little attention to be convinced of the many and sensible effects of which the sun is the principle. Its influence appears daily. Sometimes it rarefies, sometimes it condenses the air; sometimes it raises vapours and fogs, and sometimes it compresses them together, in order to form them into different meteors. It is the sun which gives circulation to the sap in trees and vegetables, which causes the leaves and blossoms to shoot, and ripens the latter into fruit. It animates all nature. It is the source of that vivifying warmth which gives to organized bodies the power of unfolding themselves and of growing to perfection. It operates even in the depths under ground where it produces metals, and gives life to animated beings. It penetrates into rocks and mountains, and its influence reaches to the very bottom of the sea. This

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alone would convince us of the power of our Creator. But if we consider with how much art God has drawn numberless great effects from one and the same instrument, and from the heat of the sun thus produced so many phenomena of nature, we should be more and more sensibly persuaded that nothing but infinite wisdom, united with boundless power, could work such wonders. Would mankind deserve to be lighted, warmed, and cheered by the sun, if, in these beneficent effects of its influence, they did not acknowledge the glorious perfections of the Being of beings; if they did not adore him with the most profound veneration?

DEC. XVIII.

Winter Rains.

HOW different are these cold rains which fall at this season, from those warm refreshing showers which in summer embellish and fertilize the earth. This change gives a melancholy appearance to all nature. The sun is veiled from us, and the whole sky appears like one immense cloud. We cannot see to any distance. We are surrounded with a gloomy darkness, and are threatened with storms. The clouds at last burst, and deluge the earth. The air seems an inexhaustible reservoir of water. The rivers swelling, break their banks, and overflow the country. However disagreeable and grievous this weather may appear to us, we must acknowledge it is for wise and beneficent purposes. The earth, in a manner exhausted by its fruitfulness, has occasion to recover its strength, and for this end not only requires rest, but moisture also. The rain waters and revives the barren dry land. The wet penetrates and reaches down to the roots of the plants. The withered leaves, which fall on the

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ground, corrupt and become excellent manure. The heavy rains fill up the rivers again, and furnish the springs with water. Nature is never idle, it is constantly at work, though not always to be seen. The clouds, by letting rain or snow fall continually from them, prepare for a fruitful year, and an abundant summer. When the heat of the sun occasions drought, the plentiful springs, which the winter rains had formed, spread abroad, and water the fields and valleys, creating fresh verdure all around. Thus, the wise Creator provides against the future; and what appears to us an evil, becomes the source of the beauties and treasures which spring and summer lavish on us. The gifts granted to us, by these means, are as innumerable as the drops which fall from the clouds; and even then, when man, still blind and ignorant, murmurs, he ought to be most thankful. Eternal Wisdom invariably continues to complete his beneficent designs. Our preservation is the principal end that God purposes in watering the earth with rain. But Divine Wisdom knows how to unite different designs, and make them subordinate to each other; and, from the proper combination of these, results the order and harmony of the universe. Thus, the animals, which exist not only for mankind, but for themselves, requiring to be supported and fed, it is for them, as well as for us, that the rains descend from the clouds to make the earth fruitful. But here, as in every thing else, we discover the wisest economy. All the vapours which daily rise from the earth are collected and preserved in the atmosphere, to be restored again to it, either in the form of little drops, heavy rains, or flakes of snow, according to the occasion. Even the smallest sprinkling, light fogs and dews, all contribute to make the earth fruitful. But in vain would vapours rise, in vain would the clouds be formed, if Nature had not furnished winds to break and to disperse the clouds on

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all sides, to convey them from one place to another, to water the ground where it requires moistening. Here one country would be deluged with continual rains; there another would suffer all the horrors of drought. The trees, herbs, and corn, would perish, if the winds did not drive the clouds to the places allotted to the rain to fall. God says, Let there be snow on the earth, and it falls in flakes; and when he says to the rain, Fall thou upon the earth, it falls in showers and waters the country. The winter-rains, however inconvenient they appear, as well as the dull temperature of this season, are absolutely necessary. So are the dark and gloomy days of our lives. They may lead us to good works. We should not, therefore, wish the sun of prosperity to shine upon us continually. It must necessarily be mixed with some days of sorrow. Let us then be resigned, when we meet with such from the hand of God, convinced as we are of the wisdom and goodness of all his dispensations.

DEC. XIX.

The imaginary Influence of Planets and Fixed Stars.

THE prodigious distance of these celestial bodies, and the little connection our globe has with them, scarce permits us to think that they can have any sensible effect upon it. There are, however, many superstitious people who give credit to their influence. But what is it that has this effect? If they mean the light of the stars themselves, or the light of the sun reflected by the planets, it evidently comes to nothing, and is much more inconsiderable than what the moon alone reflects upon us: therefore, as the light we receive from the moon has no sensible influ-

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ence upon the earth, or the atmosphere, the light of the planets and fixed stars must have still less. If it was supposed that other matter issued from the stars, and reached us, it would be without the least foundation; for if these illapses were real, they would, when collected in a burning-glass, produce some alteration or sensible change in earthly bodies, which experience contradicts. Of course, then, there proceeds nothing out of the celestial bodies but the faint light they convey to us: therefore the astrologers, whether they are weak enough to be themselves deceived, or mean to impose on others, deserve nothing but contempt, when they tell us of a beneficent Jupiter, a malevolent Saturn, a witty Mercury, of Mars inspiring warlike dispositions, and Venus inclining to love. The planets, far from producing the effects ascribed to them by astrologers, have in general none of any sort. What shall we say, then, of the Pleiades which bring rain, the impetuous Orion which foretels storms, the sad Hyades, the setting of Arcturus, and the rising of Capricorn, which presages hail and hurricanes? What influence can the constellation the Bull have on pease and beans, or the Dog-star in respect to the madness of dogs? What connection can there be between our harvest and the Scorpion? As for the rest, if the rising and setting of these constellations were only observed, in order to know the proper times for the different parts of agriculture, and not as the causes of natural things, it might be allowable. In the earliest times, the beginning, middle, and end of each season, was not marked by months, but by the rising and setting of the stars, in conjunction with the sun, or by their immersion into, and their emersion out of its rays. From thence proceeds the vulgar opinion, that the different aspects of those stars produced effects, which in reality should only be imputed to

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the seasons and consequently to the sun. Orion rises in autumn, and sets in winter, which gives occasion to say it brings storms; while it is to autumn and winter in reality they belong. The rising and setting of Orion only marks the time of those seasons. When the Dog-star rises with the sun, it is excessively hot in our zone; but that constellation is not the cause of it. These heats are occasioned by our sun being then at the highest. I say *our* sun; for in the opposite zone, when the Dog-star rises with the sun, it is so extremely cold as to freeze animals, and to cover the rivers with ice. So that the southern nations consider this constellation as the cause of cold instead of heat. It is the same in respect to the Pleiades, which are said to occasion rain, and all the other constellations, to which they impute effects that, in reality, only belong to the seasons in which these stars rise or set.—If, then, the planets and stars have no part in the temperature and natural revolutions of our globe, they can have still less upon human actions. The happiness or unhappiness of individuals, or of whole nations, depends partly on natural talents and passions, partly on the combination of certain moral and natural circumstances: but the stars can have no influence upon any of these.—If they had, we might be led to doubt the rule of Providence, and to believe that the world is not governed by a Being infinitely wise, good, just, and powerful. Who would wish to inhabit a globe where all its revolutions depended on a blind chance, or on the influence of the stars, which must be fatal both to our natural and moral state? Let us leave to the superstitious this science, so humiliating to the human mind, and so destructive to peace, which they call astrology, and which, in reality, is only a wretched abuse of astronomy. As for us, our surest foundation for happiness is to know that

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we live under the guidance of a wise, just, and good God, who directs all things.

DEC. XX.

The Polar Star.

NONE of the northern constellations are more remarkable than that which is nearest to the arctic pole, and is called the *Lesser Bear*. The extremity of its tail is but two degrees from the pole; and for that reason it is called the *polar star*. It is easy to distinguish it from the stars near it, because it changes its position very little. It is true, it turns round the pole, but its motion is so slow, and the circle it describes so small, that it is scarce perceptible. As it is therefore visible always in the same point of the sky, it is a sure guide to the mariner, particularly in the open seas. Before the discovery of the compass, the sailors had no surer guide than the polar star; and even at this time, when the sky is serene, they may, on many occasions, better depend upon it than the magnet. This reflection naturally leads us to admire the goodness of God, who, by the situation and course of the stars, has given us such a sure knowledge of times, places, and the different points of the sky. An astronomer, though in an unknown country, can tell by the stars exactly where he is. He can know the month, the day, and hour, as certainly as if he had consulted the best watch. If, for example, we only observe that the stars come every day four minutes sooner to the place where they were the day before, we consequently know that this makes two hours in each month. Thus the star which we see this night at ten o'clock, in a certain part of the sky, we shall see it again, the 20th of January at eight o'clock;

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if we observe it from the same place we are now in. The star which is now at midnight to be seen over our heads, will a year hence be in the same spot.

Let us here acknowledge God's tender mercies toward all the world. How much would those deserve pity, who have neither clocks nor geographical maps, if they could not supply the want of them by the observation of the stars. If we put ourselves in the place of those people, these reflections cannot appear indifferent to us; for we must be devoid of all feeling or humanity, if objects, which do not indeed directly concern us, but which interest so many of our fellow-creatures, should appear unworthy our attention. Let us look up with gratitude towards the Creator of all things. The use that the stars are of, in this respect, to mankind, is certainly one of the least advantages which result from the existence of those heavenly bodies; and yet this advantage alone merits our praise and thanksgiving.

DEC. XXI.

Effects of the Air when confined in Bodies.

THE effects of air inclosed within bodies are very astonishing. Nobody is ignorant of what happens when fluids are frozen. Water, when in that state, generally breaks the vessel it was put into. A musket-ball, if the mouth of the musket is hermetically sealed, bursts with great violence in severe cold. This appears at first incomprehensible. We know that water is not fluid of itself, but is made so by means of the fire, which penetrates into every part of it; consequently, it becomes a solid mass, when it is stripped of the fiery particles, or when its motion ceases through excess of cold. It seems, then, as if the particles

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of water must draw closer, and condense, and, of course, that the frozen bodies should occupy less space than they did before; yet they certainly dilate, and their size increases by freezing, otherwise it would be impossible they should burst the vessels. Besides, how could the ice swim at top, if it did not increase in size, and if it was not of course lighter than water? But what then, is the cause of this effect? It is the interior air. It is not the cold; for this is no real being nor positive quality; and, properly speaking, it cannot penetrate into the bodies. It is equally certain that heat is not the cause of this phenomenon. The air cannot insinuate itself into vessels of metal or glass hermetically sealed, and yet ice forms within them. We must therefore seek the cause of it in the air which the water itself contains, when thus shut up. To be convinced of it, we need only observe water beginning to freeze. The first coat of ice is scarce formed, when the water begins to be agitated, and a number of little bubbles rise upon it; this upper crust of ice often rises up in the middle, and cracks; then the water rushes out of the opening, flies against the vessel, and, while running down the sides, it freezes. This makes the water appear high and convex in the middle. These are all effects of confined air; effects which would not take place, or at least but in a very small degree, if, before the water had frozen, all possible air had been drawn out of it. From hence it is very easy to explain many singular phenomena. We know that there is a sap which circulates in all plants; that it thickens a little in winter and autumn, but is still fluid: extreme cold turns this sap into ice, and, by doing so, swells its size very much, which must necessarily burst, and cut some of the fibres and stalks of the plants. It is evident, then, that when the sap in spring becomes fluid again, it cannot circulate properly, no more than the blood of an ani-

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mal whose veins were cut. The growth of the plant being thus put a stop to, it dies, because the nutritive juices no longer flow through its vessels. Let us observe, however, that even this cold, which is prejudicial to plants, may, in some respects become very useful to the earth. A field ploughed before winter, is better disposed to receive the autumnal rains, and to let them sink into it. If the frost succeeds, the particles of the earth dilate and separate, and the spring then completes the making the earth light, moveable, and fit to receive the benefit of the sun and the fine weather. Enough has been said to convince us of the power of air, and of that expansive quality from whence result so many advantages to our globe. The property this element has of condensing and rarefying so wonderfully, is the cause of the greatest revolutions in our world. It is but in a very few cases that the force of this fluid can become hurtful; and even then the evil is more than compensated by the advantages which result from it. But it must be confessed that in this, as well as in every other phenomenon in nature, there remain still many things that are inexplicable. All that we know of the nature, properties, and effects of air, are reduced, in a great measure, to probable conjectures, which will be verified perhaps in future, or possibly may be proved by those who come after us, to have been ill-judged mistakes. How careful should we therefore be, when we contemplate God's works, to come prepared with humble minds, and a diffidence of our knowledge, remembering always the weakness of the human understanding, and the uncertainty of our judgments and systems. In respect to any science, presumption is inexcusable; but it becomes absolutely ridiculous, when the knowledge of nature is in question.

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DEC. XXII.

Music.

WE owe to music one of the most pure and innocent pleasures we can enjoy. It has powers to charm the ear, to calm the passions, to move the heart, and to influence the temper and disposition. How often does music suspend grief, animate the spirits, and ennoble our sentiments? An art so useful and pleasing is worth our attention, and should be made use of to glorify our beneficent Creator. But from whence proceeds the impression which music makes upon the ear? It is an effect of the air, which receives an undulating motion, and which strikes our auditory nerves in different ways. When a tight cord is pulled, it changes its form; for its elasticity makes it not only go back to its first place, but makes it also extend beyond it to the other side; and it continues vibrating back and forward till it recovers the state it was in before it was touched. These vibrations communicate with the air, which conveys them to other contiguous bodies. For example, when an organ is played on, the strings of a lute, if near it, are put in motion, and make a sound. But what occasions the difference of sounds? Why are some sharp and others flat? It is not the quantity of air put in motion; for a sound may be sharp or flat, and at the same time weak or loud: neither can it be imputed to the swiftness of the undulations by which the sound is propagated in the air; for a sharp note does not go more rapidly from one place to another than a flat. The difference proceeds, then, from the quickness of the fluttering of the air. A sonorous body makes a sharp tone when the vibrations of its parts are quicker, and a flat one when they

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are slower. But why are certain sounds, when united together, harmonious and pleasing, whilst other sounds make discord? The only answer to this is, that the natural character of harmony consists in being in the same key, while in discordance, on the contrary, though the notes are struck at the same time, they disagree, and produce a double sound to the ear, which affects it unpleasantly. But of what use would the harmony of sounds be, if we could not distinguish them from discord! Let us therefore bless God for having enabled us to receive and distinguish the different impressions of sound, and for having given to our souls the power of associating certain ideas with bodily sensations. How much more gratitude is due to him for the many pure and innocent pleasures he has given us to enjoy! Let us express our sense of it, by making use even of music to glorify his name! Let us join in the most melodious sounds, to lift up our hearts towards our great Benefactor, and to celebrate his goodness.

DEC. XXIII.

Comparison of Men and other Animals.

IN the comparison we are going to make between men and other animals, there will be found some things which are in common with us and the brute creation; others, in which they have the advantage over us; and, finally, some in which we are superior.

Man chiefly resembles other animals in respect to matter. We have, like them, life and organized bodies, which are produced by propagation and birth, and supported by food. We and they have also alike animal spirits, powers to fulfil the different functions assigned to us, contrary motions, the free exercise of our limbs, senses, sensation,

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imagination, and memory. By means of the senses, they, as well as we, feel the pleasure and pain which make us desire certain things, and fear others. A natural instinct prompts us, as well as them, to preserve our lives, and to continue our species. Lastly, We are equally liable to those general bodily accidents which the chain of things, the laws of motion, the construction and organization of our bodies, must necessarily occasion.

In respect to the happiness resulting from sensual pleasures, animals have many advantages over us. One of the chief is, that they do not require the clothes, defence, and conveniencies we need; nor are they obliged to invent, to learn, and exercise, the arts necessary for these purposes. At their birth they bring with them every thing they want, or at least have only to follow the instinct which is innate in them to obtain all that can make them happy. This instinct never deceives them. It is a constant sure guide. And as soon as their appetites are satisfied, they are perfectly content; they desire no more, and are never guilty of excess. They enjoy the present without troubling themselves about futurity. There is every reason to believe that animals have not the faculty of representing to themselves the future. A sense of the present warns them of their wants, and instinct teaches them how to apply them. They never think of the morrow. Death itself comes upon them without their having foreseen it, or being disturbed about it before-hand. In all these circumstances they have the advantage of man, who must reflect, invent, labour, exercise, and receive instructions, otherwise he would remain in perpetual childhood, and could scarce procure himself the necessaries of life. His instinct and passions are not sure guides to him. He would be wretched were he to give way to them. Reason, alone, and its consequences, make the essential difference

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between him and the brutes. It supplies all deficiencies; and, in other respects, gives a superiority to which they can never attain. By means of this faculty, he not only obtains every necessary and convenience, but also multiplies the pleasures of sense. It ennobles them, and makes them so much the more sensibly enjoyed, as he can render his desires subservient to reason. His soul is capable of pleasures entirely unknown to other animals: pleasures which spring from science, wisdom, order, religion, and virtue, and which infinitely surpass all those of which the senses are the organs; because, far from being contrary to the real perfection of man, they continually add to it; because they never forsake him, not even when his senses, deadened by sickness, old age, or any other circumstance, become insensible to all animal enjoyments; because, in fine, they make him more and more resemble God; while, on the contrary, the more he yields to sensual pleasures, the more he degrades himself to the likeness of a brute.—Let us add, that animals are confined within a very narrow sphere; that their desires are very few, and consequently their pleasures are little varied; whereas man has an infinite number of them. He draws some out of every thing; and there is nothing which he cannot make use of some way or other. He makes continual new discoveries, acquires further lights, and makes boundless progress in the road to perfection and happiness; whereas the beasts are always confined within their narrow limits, never invent or improve, nor ever rise above other animals of their species. It is reason alone, then, that gives us the superiority over the brute, and it is in this that the excellence of human nature mostly consists. To make use of our reason, in order to ennoble the pleasures of sense, and to enjoy more and more those that are intellectual, so as to improve daily in wisdom and virtue, this is what distinguishes man. This is the end for which

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he was created. Let it then be our constant study to answer this purpose; for we can only be happy in proportion as we follow what reason points out to us as useful and right.

DEC. XXIV.

Calculation relative to the Resurrection.

WITH what a crowd of human creatures will the place where our city is situated be covered at the great day of resurrection! What multitudes spread over the whole earth, prodigious indeed, but not innumerable! for each of the dead that rise will be known by the Lord his Judge: each name is written in his book: None will fail, none will be lost; not one of those whose bodies were laid in earth can escape the all-seeing eye of the Most High. Supposing Germany, our country, to have only begun to be peopled 500 years after the universal deluge, consequently, within about 4500 years, and that from the foundation of our city to this time, even to the day of judgment (if it was to happen this year, there has been annually buried, reckoning one year with another, only 200 people, the number of dead would amount to 900,000. If, then, our single city would already furnish 900,000 persons for the day of judgment, how great a number would all Germany produce! —In admitting the number of inhabitants to be about twenty-four millions, we cannot reckon our city to be more than the three-thousandth part of the whole. If that is the case, one may suppose, from the foregoing calculation, that Germany will furnish 2100 millions. This number is certainly prodigious, and yet what is it in comparison of what the whole earth contains, which is reckoned to be at present more than 1000 millions? If we fix it at this number, and calculate it as above, the

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total of those who have died during the above-mentioned space must amount to 87,500 millions. If we afterwards add to it those who lived before the flood, and those who died after it, in the space of 500 years, a number which may be reckoned as a quarter of the preceding, the total will then amount to 109,375 millions. Lastly, Let us add to it the inhabitants of the earth, who may be living at the day of judgment, and only fix the number as before at 1000 millions, and the whole will amount to 110,375 millions. Let us figure to ourselves this prodigious multitude, which will appear before the Judge of the world. How great must that Intelligence be, which can look into the mind of every individual of which this multitude will be composed! who will know exactly their thoughts, words, and actions; who will perfectly remember the day of their birth, the duration of their existence on earth, the time, manner, and circumstances of their death; who will be able to distinguish the atoms so dispersed from each of them, to separate, to unite them again, though their bodies had been reduced to ashes, dissolved into a million of parts, and undergone numberless transformations! What an almighty work, to collect these earthly atoms, to purify them, to ennoble, and to form them for immortality!

DEC. XXV.

Thoughts on Christmas-Day.

WHAT sentiments of gratitude and joy arise in my soul this day, on which we celebrate the birth of Jesus! But, at the same time, what is my surprise when I reflect on the circumstances which attended this great event! I behold a Son of man in the lowest state of humiliation; and this Son of man is my God! I behold the mighty, the invi-

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sible God, at whose word the heavens and earth were made; at whose word they will fade away! And I see, at the same time, a being, visible, weak, and clothed in flesh as I am! How wonderful is this union, the King of kings, whom angels adore, appearing under the form of a servant!—a child, weak, destitute, shedding tears, lying in a manger! What astonishing humiliation! Human nature, so limited, so corrupted, risen with Jesus Christ upon an eternal throne of glory! What a miraculous change! But can I well comprehend the greatness of this divine mercy! Or, rather, does not the astonishment and admiration, with which they inspire me, doubly increase, when I reflect on my own unworthiness, and the infinite majesty of our Saviour? Certainly it was a love which infinitely surpasses all I can merit; a love beyond all I could conceive or hope; a love which I have only silently to admire and adore. But if my sense of his goodness is great, my joy and hope are no less so. In this union of God and man, I behold the joyful emblem of the new covenant. Faithful to his promises, God has sent his Son into the world, that through him we may have eternal life; and have we not assurance, that all which was promised in his name will be accomplished with equal fidelity? Christ would never have honoured our nature so as to unite it with his own, had he not resolved to cure our infirmities by his power, to pardon our faults, to wipe out our sins, and thus to restore human nature to its original purity and innocence. What then is more natural and just than to give ourselves up entirely on this solemn day, to a sense of pious gratitude! It is true that little is in our power to return for such inestimable love; let us at least do that little, and hope that our weak but sincere gratitude will be pleasing in his sight. Such are the sentiments with which we ought to celebrate this solemn festival. Let not our ad-

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miration be the fruit of ignorance, but of an enlightened conviction; neither let our hope be the effect of a blind persuasion. If it is the work of a pure faith, what sweet consolation, what heavenly joy, will fill our hearts! It will enable us to support every thing in life, because it is a felicity which nothing can destroy.

DEC. XXVI.

The Place of our Saviour's Nativity.

IT seems at first sight to be of little consequence to us to know the place of Christ's nativity; for we should still consider him as our Redeemer, whatever the circumstances might be which attended his mortal life. But since it pleased God to declare the place in which the Saviour of the world should be born, it became necessary that it should happen precisely there; and it was one of the characters by which Christ was known to be the true Messiah. It is also of little importance to us, what place we ourselves live in, provided we find true happiness. There is no part of the earth, however poor and despicable, where there may not be better and happier people than some of those in the greatest and most celebrated cities. Do we know a single spot of our globe where the works of God do not appear to us under a thousand striking forms, and where we might not experience the sweet satisfaction which flows from a good conscience? For each individual, the place preferable to all others is that in which he may enjoy the best health, and do the most good. For a whole nation, it is the place which contains the greatest number of wise and virtuous men; for every nation declines in proportion as religion and virtue lose their influence over them. The place where a young man may,

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for the first time, have contemplated the morning dawn of nature renewed, with the most lively sensations of pleasure, and adored God with all the love and veneration his heart was capable of; the place where a virtuous pair first learned to be acquainted, or that where two friends gave each other the noblest and most affecting proofs of tenderness; the village where any one may have seen, or may himself have given, remarkable examples of goodness, justice, and patience; such a place ought it not to be dear to their hearts!—According to this rule, Bethlehem was, though small, a venerable place, as it contained many good and pious people. The patriarch Jacob staid there some time, in order to erect a monument for his beloved Rachel. It was at Bethlehem, that the worthy Naomi, and Ruth her modest daughter-in-law, gave proofs of their faith and virtue. And it was there Boaz, that generous benefactor, lived and had his possessions. Bethlehem was the abode of the humble Jesse, the happy father of many sons, the youngest of whom rose from the state of a shepherd to the throne of Israel. It was there that the prince Zerubbabel was born, that descendant of David, who was the type of that Ruler and Shepherd about whom Israel was one day to be assembled, and live happily under his government. Lastly, There appeared the Son of God, whose birth laid the foundation for our redemption. Thus, in places too small to be remarkable, men are sometimes born who afterwards become the benefactors of mankind. A village often produces a man, who, by his wisdom, uprightness, and heroism, becomes a blessing to whole kingdoms. It is certain, that true piety would make a rapid progress over the earth, if we every where endeavoured to give proofs of innocent morals, and fervent faith. If our cities furnished more examples of virtue, their influence would extend

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to the country; and in the smallest village there would be found families, who, like that of Joseph and Mary, would distinguish themselves by their uprightness and piety, and would attract respect in the midst even of poverty and humiliation. Then would God shed blessings over the country of these good people; and after some generations, a nation would be formed who would all walk in his paths. He who has travelled most throughout the world, who has visited great cities, and been a witness to the numberless crimes committed there, has he not reason to be thankful, if he at last finds a village where, in a peaceable cottage, surrounded with quiet neighbours, he may devote himself to the service of God and humanity, and by these means enjoy the only true content, that which arises from tranquillity and peace of mind? He will not then regret places, more magnificent indeed, but wherein luxury lays many snares; more extensive, but where vice governs; more rich, but where they live in a forgetfulness of God and their duties. He will surely prefer to them the obscure retreat, where, secure from bitter remorse, he may live peaceable and happy.

DEC. XXVII.

Cares of Providence towards Mankind from their Birth.

WHAT a multitude of wants we have at our birth! We do not even come into the world without assistance; and we should soon lose the life we receive, had not many necessaries been prepared beforehand for us, and were we not in this helpless state to be under the protection of others, or rather, were we not preserved by our heavenly Father himself, who took care of us even in our

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mother's womb, but whose great mercies extended still farther than the moment of our birth. At that period was laid the foundation of all our future happiness. Weak, poor creatures, we neither did or could know what our fate would be; but all was perfectly known to God. He saw the whole of our lives; all the contingencies and future events, with their consequences and connections. He knew what would be best for us, and regulated our state accordingly; and, at the same time, determined on the means he would make use of to procure us the blessings his goodness designed us. From our very birth, the causes existed which were to influence our future happiness, and they already began to act conformably to his views. How much does the happiness or misery of life depend on our parents, their way of thinking, situation, &c.? How much the education we received in our youth, the examples we had, the connections we formed, the opportunities which presented of exercising our powers and talents; how much does all this influence the happiness of our lives? Is it not God that prepares all these circumstances for us? If he has watched over our happiness, he has with equal goodness directed those events which may have appeared unfortunate to us. He has foreseen and ordained all of them; he has dispensed them with wisdom, and from motives of mercy. He knew that adversity was good for us. He knew when sorrows were to begin, and the sources from whence they would spring, as well as the consequences of them. These causes for some time act in secret. By degrees they unfold, and we may know, and acknowledge, that our distresses and sorrows were necessary to our real happiness. But they would not have had such salutary effects, without the concurrence of many causes which acted remotely a long time before, and were unknown to us. This reflection ought naturally to fill our minds with

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tranquil hope. What can be more comfortable than to be convinced that there is an invisible Being who protects us? a Being infinitely good, wise, and powerful, who watched over us even in our mother's womb; who, from that moment, settled every thing necessary for us during our lives; who has reckoned our days, and appointed a term for them that no human power can change; who has ordered all for our temporal and eternal happiness? How unshaken must be the peace and confidence which rest on such a persuasion.

DEC. XXVIII.

Term of Human Life.

EVERY man dies precisely at the time God has decreed he should. As the time of our birth is fixed, so is that of our death. But the term of our lives does not depend on inevitable fate. There is no such thing in the world. Every thing that happens might happen sooner or later, or even not happen at all. It might always be possible, that the man who dies to-day had died sooner, or lived longer. God reckons not any body's days by an absolute and arbitrary decree, or without respect to circumstances. He is an infinitely wise God, who does nothing without motives worthy of himself. He must therefore have had just reasons for decreeing that such a person should quit the world at one time rather than at another. But though the term of life is neither from necessity or fatality, it is not the less certain, and is never in reality changed. When a man dies, there are always causes which infallibly bring on his death, unless prevented by a superior Power. One person dies of a mortal disease, another by a sudden and unforeseen accident. Some perish by fire, and some by water.

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God foresees all these causes. He is not an idle indifferent spectator of them. He examines all with care; he compares them with his designs, and sees whether he approves them or not. If he approves them he determines them accordingly; and there exists a divine decree, by virtue of which the man dies at such a time, or by such an accident. This decree cannot be revoked or prevented, because the same reason God has at present for taking a man out of the world was known to him from all eternity. He judged of it then as he does now; and, of course, nothing can induce him to revoke his decree. But it is possible that God may not approve the causes of a man's death when he foresees them. In this case, he determines at least to permit them. But if God resolves to permit those causes of death, it is his will that we should die at the time in which the causes existed. In reality, he was disposed to grant us longer lives, and does not approve these causes of our death; but it was not consistent with his wisdom to oppose them. He sees the universe in the whole, and finds reasons which engage him to permit men to die in such a time, although he neither approves the causes, manner, or circumstances of their death. His wisdom finds means to direct these deaths to useful purposes; or else he foresees, that longer lives, under their circumstances, could neither be beneficial to themselves or to the world; or possibly he finds, that, in order to prevent these deaths, it would require a new combination of things, such as would not agree with the general plan of the universe. In a word, though God sometimes disapproves the causes of a man's death, he has always just and wise reasons for permitting it, and for decreeing, consequently, that the man should die at such a time, and in such a manner. These reflections are calculated to make us meet death with Christian fortitude. What renders

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death dreadful is chiefly the uncertainty of the time and the manner of it. If we knew, beforehand, when or how we should die, we should expect death perhaps with more firmness, and should fear it less. Now, nothing can more effectually encourage and calm our minds in this respect, than the persuasion that a Providence watches over us, who from the foundation of the world, decreed, with infinite wisdom and goodness, the time, manner, and every circumstance of our deaths. The term of our lives is appointed, and nobody can die sooner or later than God has decreed, for the good even of the person himself. An Almighty Providence watches over our days, and prolongs or shortens them as he thinks best for us, as well in respect to this world as the next. Persuaded of this comfortable truth, we may quietly expect death; and since the hour of it is uncertain, let us be prudently prepared to meet it at any time. Most certainly it will not come till God thinks proper. We are ignorant, it is true, of what kind of death it may be; but it is enough to know that we can only die in the way that the merciful Ruler of the world judges best for us, and for those belonging to us. Supported by this thought, let us continue our earthly pilgrimage without cares or anxiety; let us submit to the dispensations of Providence, and not fear any dangers to which our duty calls us.

DEC. XXIX.

Instability of Earthly Things.

THERE is nothing in nature that is not liable to change. Every thing is uncertain and frail. Nothing is durable enough to remain always like itself. The most solid bodies are not so impenetrable, nor their parts so closely united, as to preserve

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them from dissolution. Each particle of matter insensibly changes its form. How many changes has each of our bodies undergone since its formation in our mother's womb? Every year it has lost something of what made a part of itself, and has acquired new parts drawn from the mineral, vegetable, and animal substances. Every thing on earth increases and decreases by turns; but with this difference, that the changes do not operate as quickly in some bodies as in others. The celestial globes appear to be still the same as at the moment of their creation; and they are perhaps the most invariable of all bodies. Those, however, who have observed them with attention, perceive that some stars have disappeared, and that the sun has spots which change, and thus they prove that it is not constantly the same. Its motion also makes it liable to variation; and though it is never extinguished, it has been obscured by fogs, clouds, and even by internal revolutions. This is all we can know of it at the immeasurable distance there is between us. How many other external as well as internal changes we should discover, were we nearer! If we are still more struck with the instability of earthly things, it is because they are within our view. And how frail are these! how liable to change! Each object continues to look like itself, and yet how different, in reality, is it from what it was! We daily behold things taking new forms; some growing, others diminishing and perishing. This year, which in two days will be at an end, affords undeniable proofs of it. In each person's own little circle, they must have experienced many revolutions. Several of those we had known for many years are no more. Many whom we have seen rich are become poor, or at least are but in an indifferent situation. If we examine ourselves also, we shall find a difference in many respects. Has not our health and activity diminished? And are

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not all these things warnings of approaching towards that great and final revolution which death will operate upon us! Besides, there are many changes may still happen in the two remaining days of this year. We may become poor or sick; we may experience the infidelity of friends, or even die in that space of time. Such reflections may inevitably oppress and sink us in despair, if religion was not our support and consolation. But this leads us on to the only invariable, everlasting Being, whose very nature is immutability, and whose mercy has no end. Full of confidence, therefore, in his unchangeable goodness, let us submit with resignation to all the changes in this transitory world.

DEC. XXX.

Calculation of Human Life.

THE approaching close of the year leads me to reflections, which, however important they may be, do not always occupy me as they ought. In order to feel more sensibly how short the date of life is, I will examine now the use I have made of the past days; though I have reason to believe it will prove a subject of humiliation to me.—I first recal to myself those days it was not in my power to command. How many hours have been employed in mere bodily wants? How many more have passed in trifling occupations, of no service to the mind? Thus, in slightly looking over the use made of these years, I discover a multitude of days lost to the immortal soul which inhabits this body of clay; and, after these deductions, what will remain which I may justly say have been employed for real life? Out of 365 days, it is plain that I can scarce reckon

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fifty which I can call my own, as having promoted my eternal happiness. And the little that remains of time, how much do I lose of it by my own fault and weakness! How many days sacrificed to vice and folly! Perhaps many of those days granted me for reflection have been devoted to the world, to vanity, to idleness, and false pleasures. Perhaps they may have been profaned by impurity, envy, jealousy, slander, and other vices, which betray a heart void of respect for God, and charity to our neighbour. Even since God has made me better, and inspired me with a desire to walk in his paths, how much time has been irrecoverably lost in thoughtlessness, indifference, doubts, anxiety, want of temper, and all those infirmities which are the effects of our frailty and weakness of reason. Lastly, How swiftly does the little space of time we can dispose of fly away! A year passes almost insensibly, and yet a year is of great consequence to a being whose life is reckoned by hours. When we recollect how little of it we may have spent suitably to the purposes of our creation, we might well wish to recal those hours which were ill-employed. But it would be vain. The year, with the good and bad actions which have marked it, are swallowed up for ever in eternity.

Forgive us, then, O merciful Father! the faults we have had the misfortune to commit; and grant us thy grace in the hour of death, in the day of judgment, and to all eternity.

DEC. XXXI.

Close of the Year.

HAVING given some hours every day in the year to the study of nature, it will not perhaps be

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displeasing to the reader to recapitulate the twelve months, in an allegory pointed out by Mons. de la Court de Gibelin, in his "Monde Primitif." He considers symbols and allegories, such as the scriptures are full of, as a key to all the knowledge of ancient times; in which notion he is not singular. I can here only give his account of Hercules, whom he considers as the emblem of agriculture, or man so employed; and his twelve labours, as the employment of the twelve months. I shall begin the year at the autumnal equinox.

1st Labour.—The Nemean Lion. September and October.

The heat and toil of harvest being ended, man rests for a short time; and the lion, a known emblem of heat, is said to be conquered by Hercules.

2d Labour—Hydra of Lerna. October and November.

Moisture and heat produce vermin and insects. The riches of the field and garden are threatened with destruction. Hercules must defend them from these enemies, which, like the hydra's heads, increase as fast as they are destroyed.

3d Labour—Battle of the Lapithæ and Centaurs.

By this symbolical creature is represented man, whose sensual part carries away the rational, especially when wine, and the indulgences allowed at the time of vintage, invite him to excess. This Hercules must conquer or die.

4th Labour—Silver-footed Doe. December.

Hunting, now considered only as a pleasure, was at first a business of consequence, and this the fittest month for Hercules to conquer his ferocious enemies, and provide food and clothing.

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5th Labour—The Birds of the Lake. January and February.

The birds begin now to multiply, and though friends to Hercules in some respects, are in others very dangerous foes. Timely foresight must conquer this enemy.

6th Labour—The Augean Stable.

It is strange that this story should not at least point out the whole to be an allegory. What can be more ingenious than the contrivance of rafts, to convey by water the necessary but offensive manure! The cleansing a stable, by passing a river through it, when taken in this light, is a labour worthy of Hercules.

7th Labour—The Cretan Bull. March and April.

The humble ox, submitting to the yoke, is the furious bull tamed, and made useful to man. Hercules can now plough and sow, and with pleasure pursue the necessary toil of this season.

8th Labour—Diomede's Mares.

To tame the horse, the dam must be laid hold of when with colt, that the young one may be educated by man, and not left wild in the forests. The pleasure this creature bestows, and its use in country affairs, must deservedly place the conquest of its species among the victories of Hercules.

9th Labour—War with twelve Amazons. May and June.

The sun (the soul of agriculture), now at the solstice, may be said to be the conqueror of the twelve months, and of their attendant labours; though the beginning of the year is not here placed at this season, nor perhaps ever was.

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10th Labour—Geryon's Cows.

This name signifies abundance, a heap; and Isis, the cow, the emblem of fecundity. The time of planting is also the time of foresight. The dairy must be attended to. The art of preservation is no small part of the husbandman's care.

11th Labour—Cerberus brought up from Hell or Hades. July and August.

Hades means a hidden place, the lower hemisphere, and the place of departed spirits. Cerberus is the dog-star raging at this time.

12th Labour—Hesperian Gardens guarded by Dragons. August and September.

The greatest abundance of fruits, &c. are well expressed by the rich garden; the necessity of defending them from theft, or imprudent waste, is the dragon. The pillars express the pious confidence of the cultivator (Hercules), trusting to Divine Providence for the same return of yearly blessings, if not wanting in his own endeavours.

Besides the labours of agriculture (or Hercules), we are to consider his birth and latter end, followed by his apotheosis. Two serpents, the emblems of the two luminaries which direct the year, are placed in the hands of a child, to point out the origin of time. Hercules, on the funeral pile, weary of life, expresses to the eye the end of all things by fire, and these words of the patriarch, "I am but dust and ashes," dust in the beginning, ashes in the conclusion.

If we are, with Mons. Gibelin, to take the heathen mythology as a lesson of virtue and industry; or, as the wisdom as well as the folly of the ancients, according to Lord Bacon, we may learn to consider our great Creator, not as a careless Jupiter, indulging sometimes sleep; but as a

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tender parent guiding and supporting helpless creatures; providing pleasure and instruction in every object; allowing long life, even after the fall, for the perfecting of every art and science; and withdrawing no means of happiness, till ungratefully abused; and still preserving to us the glorious hope of happiness after death, pointed out by the reception of Hercules into heaven, of patient toil and industry rewarded by glory.

THE END.

W. Wilson, Printer, St. John's Square.

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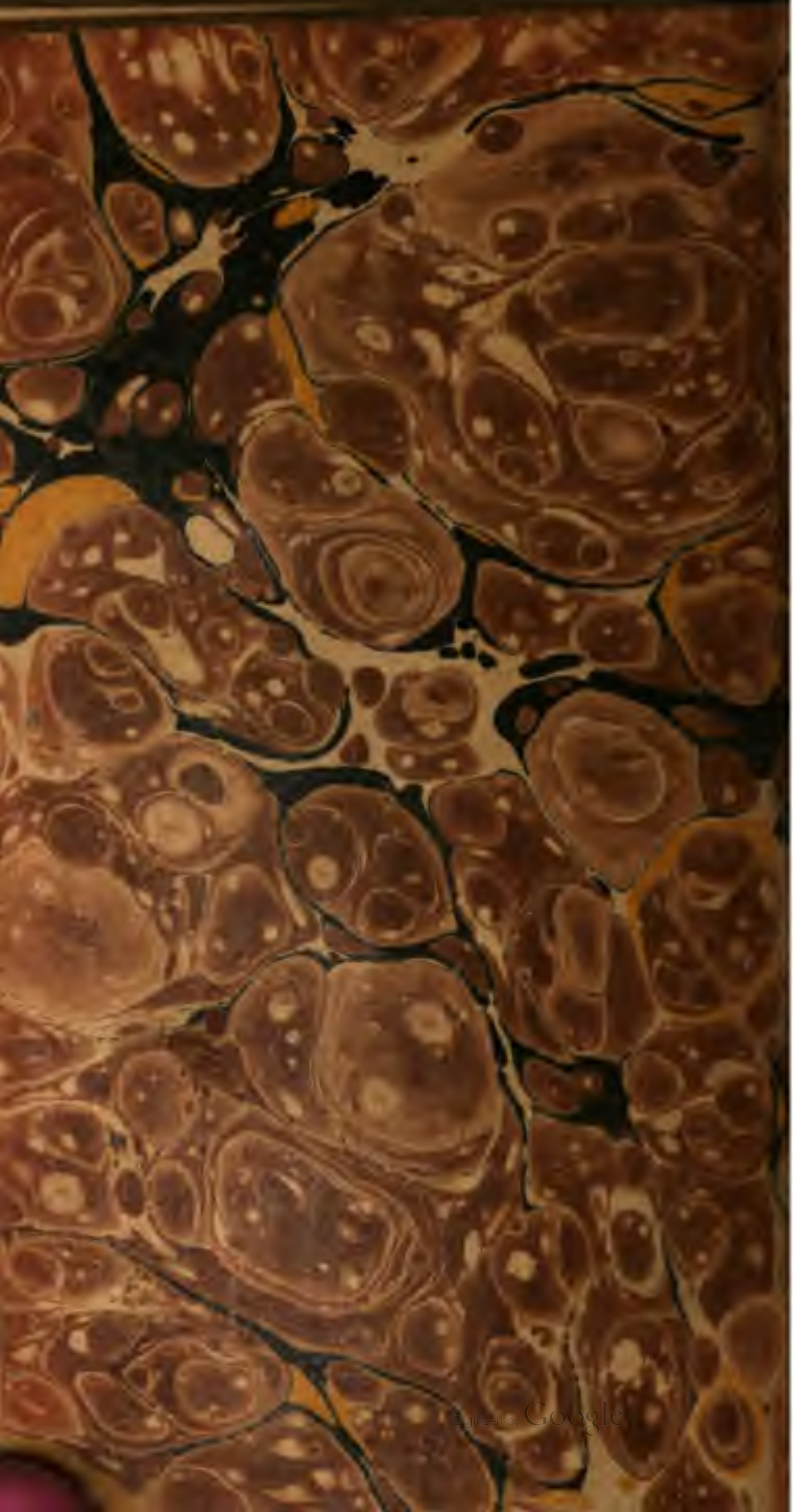
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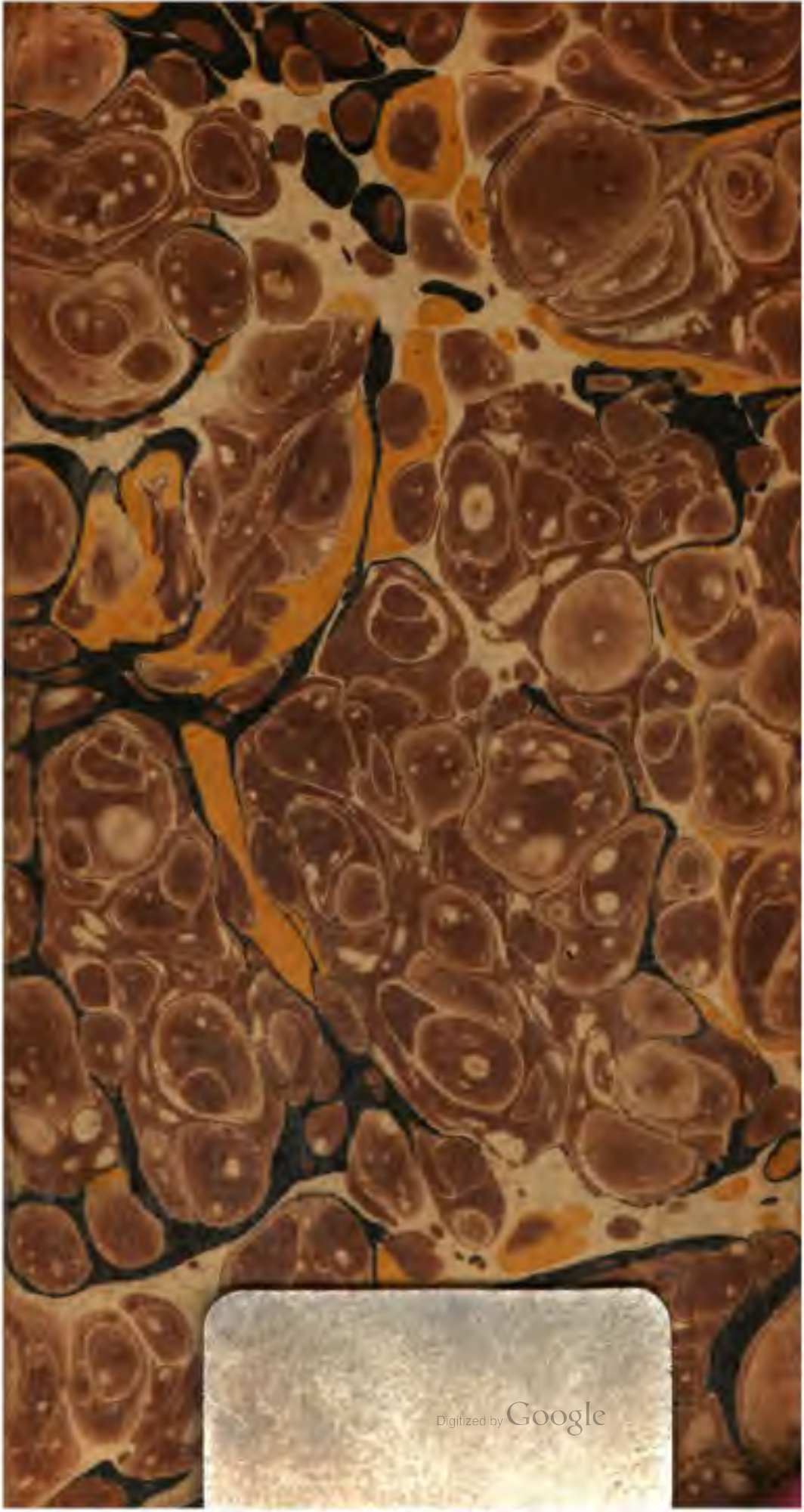
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